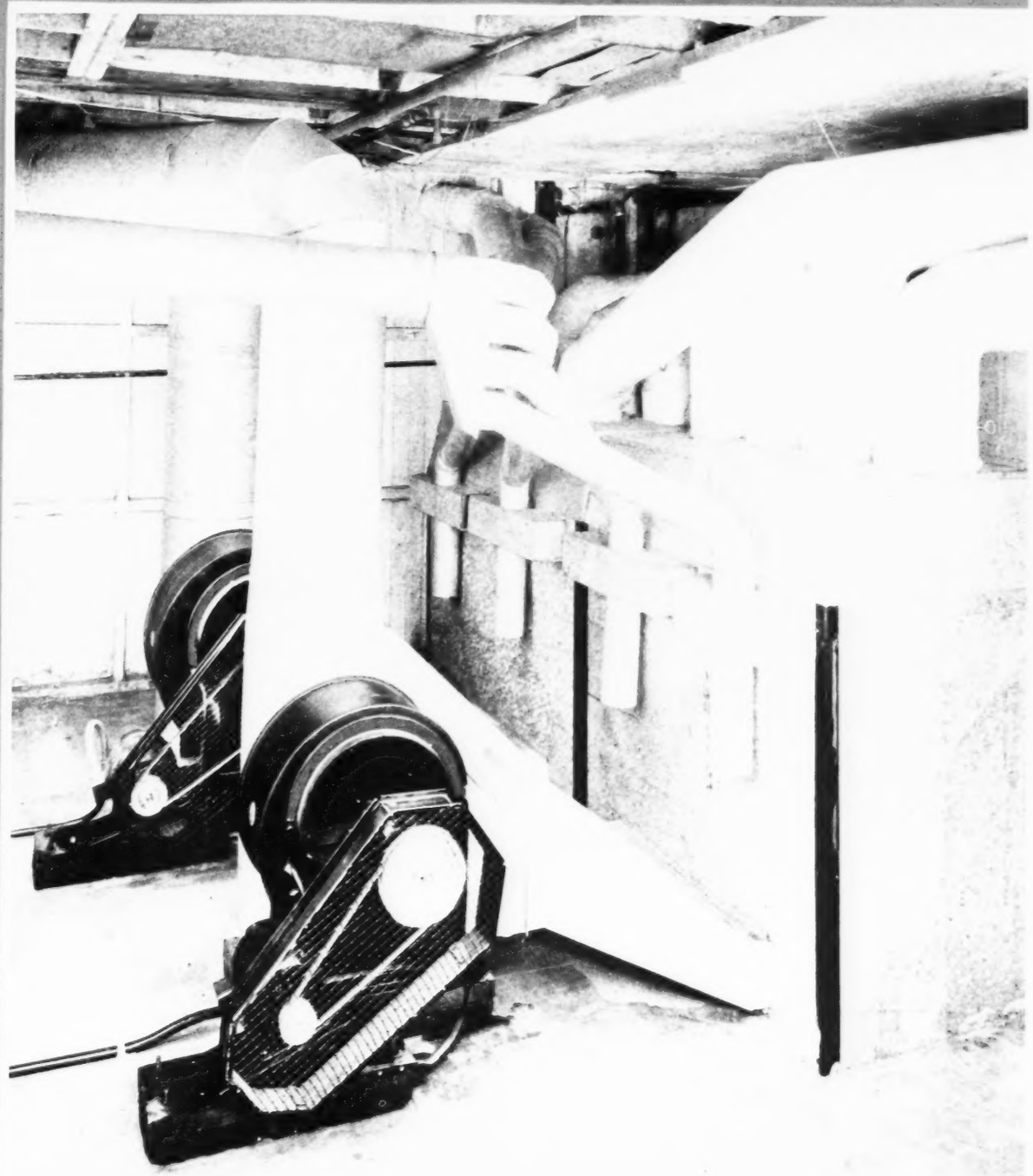
# AMERICAN ARTISAN

## WARM AIR HEATING • SHEET METAL CONTRACTING • AIR CONDITIONING



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1932

# TONCAN IRON WELCOMES VISITORS . . . TO ST. ANTHONY'S HOSPITAL

Above the main entrance to this new St. Petersburg, Florida, hospital is an artistic marquee of Toncan Iron. Downspouts, gutters and other sheet metal work on the hospital are also made of this longer-lasting metal, while ENDURO, Republic's Perfected Stainless Steel, was used for kitchen equipment and sterilizers. All of these are the products of skilled hands in Brownie's Sunshine Tin Shop, St. Petersburg.

Sheet metal contractors looking for new ways to make money will find in Toncan Iron and ENDURO two valuable allies. Because of their longer life they can be used where ordinary sheet metal is no longer economical. They are easy to work. They bring new sales arguments to combat the "low price" evil. They build good will and open the way to future business at prices that will yield a profit.

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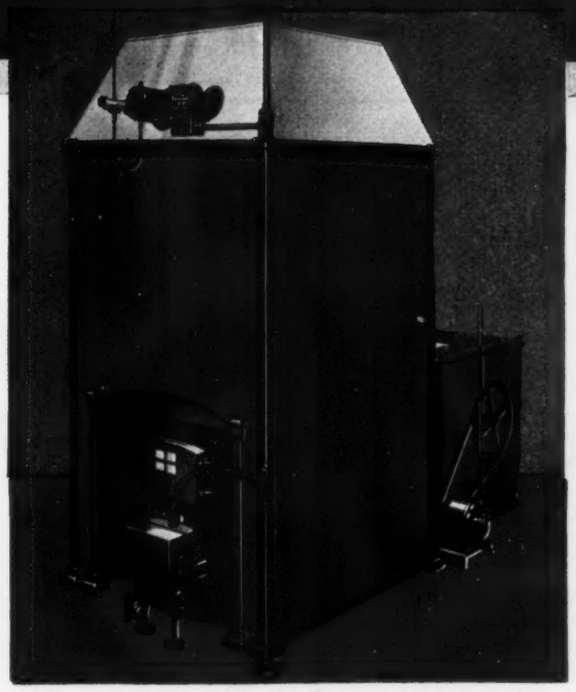

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# AMERICAN ARTISAN

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NOVEMBER, 1932

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Entered as second-class matter, July 29, 1932, at the Post office at Chicago, Illinois, under the act of March 3, 1879. Formerly entered on June 25, 1887, as American Artisan and Hardware Record

# "It's Smart to be Thrifty"

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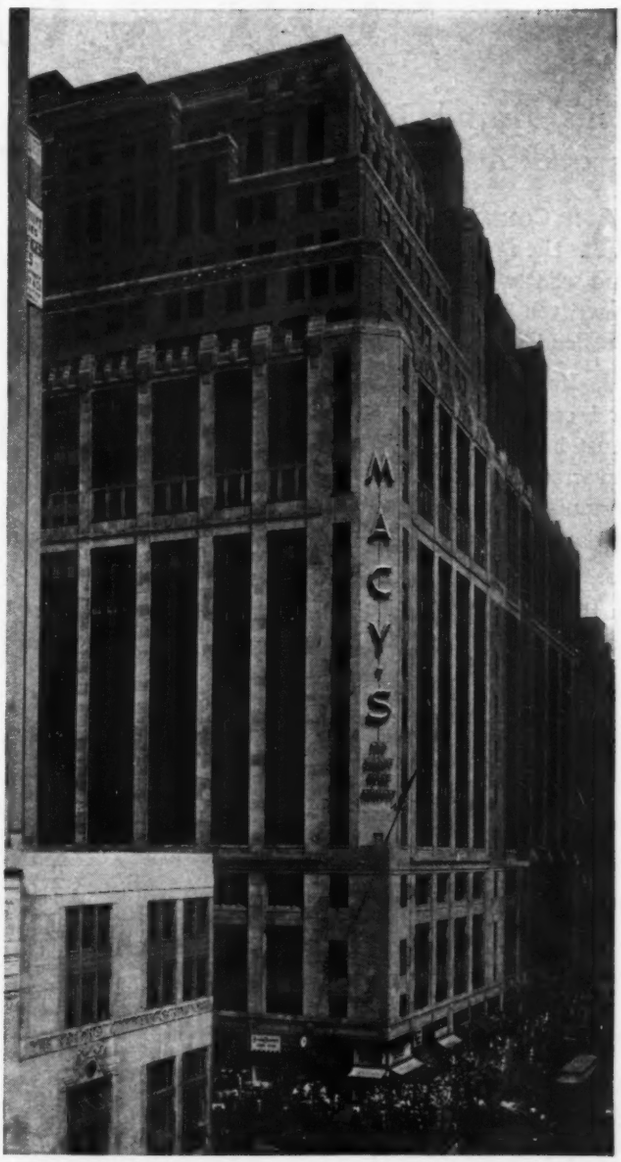


*50,000 pounds of Revere Sheet Copper were used in Macy's new building. Architect: Robert D. Kohn . . . General Contractor: Marc Eidlitz & Son, Inc. . . . Sheet Metal Contractor: Sobel & Kraus. All of New York.*

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### CONTENTS OF AIR CONDITIONING FOR COMFORT

Chapter 1.—Explanation of Terminology.
Chapter 2.—Instruments of Service in Air Conditioning.
Chapter 3.—Relation of the Human Body to Air Conditioning.
Chapter 4.—The Influence of the Type of Heating System Upon Air Conditioning.
Chapter 5.—Heat Transmission Through Building Materials.
Chapter 6.—Calculations for Air Conditioning Requirements.
Chapter 7.—Sunshine, Evaporation, Air Leakage and Lighting.
Chapter 8.—Air Distribution Within Rooms of Cooling Systems.
Chapter 9.—Controlling the Temperature in Air Conditioning Systems.
Chapter 10.—Water Circulation in Heating and Cooling Systems.
Chapter 11.—Air Ducts in Heating and Cooling Systems.
Chapter 12.—Computations for an Actual Design.

### 36 Tables, 94 Figures, Charts and Diagrams in This New Book, of Which the Following Are Examples:

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### ANSWERS SCORES OF SUCH QUESTIONS AS THESE:

—What are the strong points of the different cooling compounds? (See page 26)
—What are the different humidifying devices available?—dehumidifying devices? (See page 8)
—What is relation of the human body to temperature—moisture — motion — chemicals — radiation — convection—evaporation—sensible and latent heat? (See page 42)
—What cooling system will work best with the various heating installations? (See page 60)
—How do you calculate air conditioning requirements? (See chapter 6)
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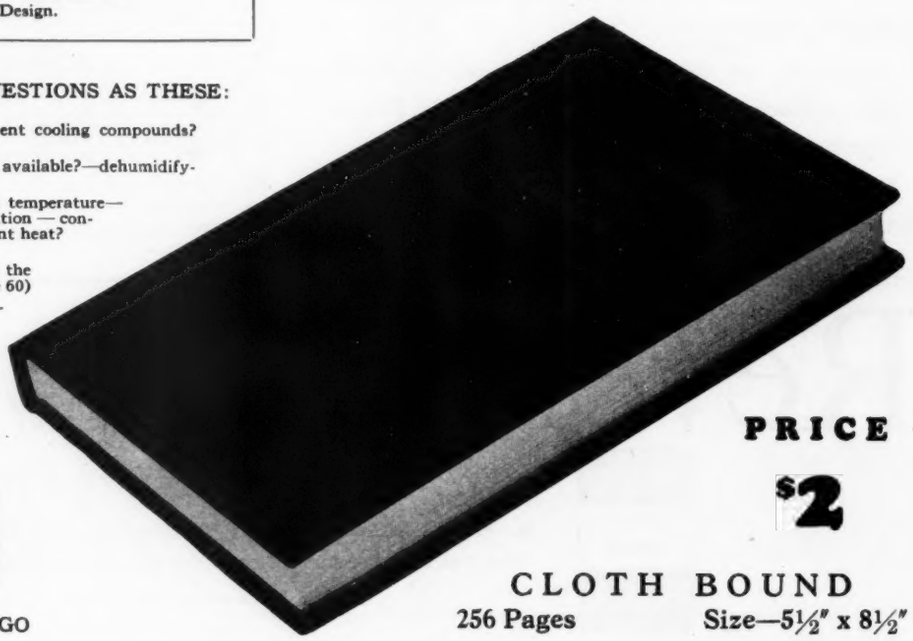

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**AMERICAN ARTISAN**

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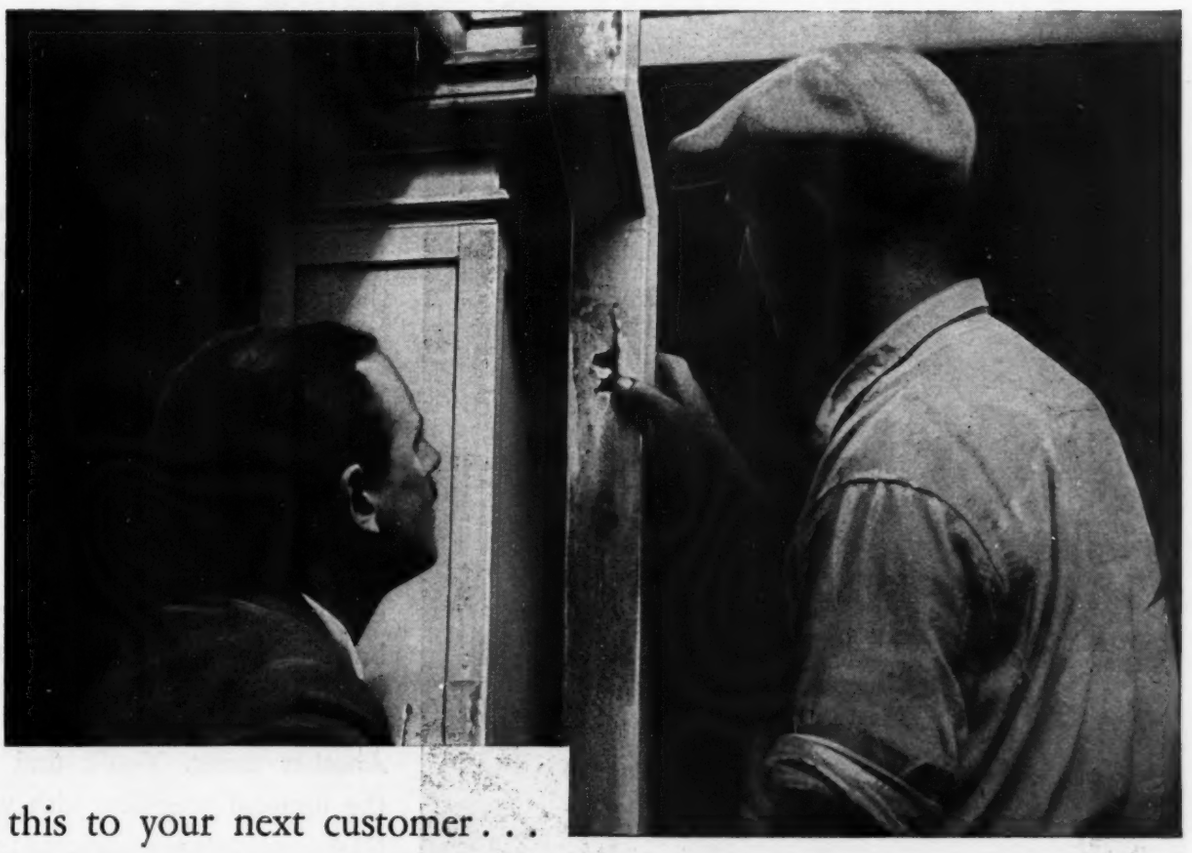

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BY EXPLAINING that copper is the most economical metal to use, many contractors today are securing sheet metal business at a satisfactory profit. For most home-owners will pay a fair price for copper, when they appreciate its advantages . . . and when they realize that, for a 7-room house, copper gutters and rainpipes cost them only about $35 (national average) more than rustable metal.

Leading sheet metal supply houses carry Anaconda Copper . . . the accepted standard of sheet metal quality . . . in sheets, rolls and Economy strips, and copper gutters, leaders, elbows and shoes trademarked ANACONDA. Remember that Anaconda is easier to sell because it is backed by the industry's best known name. The American Brass Company, Waterbury, Conn.

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Because of that unified control Globe can maintain rigid standards, resulting in greater resistance to corrosion, longer service for your customers, good will and repeat business for you on all sheet metal work and formed products.

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# SHEET METAL Building Products

GLOBE TRADE MARK BRAND

**THE GLOBE IRON ROOFING & CORRUGATING COMPANY, Cincinnati, Ohio**

*Fabricators of Zinc Institute—Seal of Quality—Two Ounce Coated Galvanized Corrugated Roofing*

VOLUME 101 AMERICAN ARTISAN NUMBER 17

WARM AIR HEATING • SHEET METAL CONTRACTING • AIR CONDITIONING

# Developments of Wide Importance

## Public Contracts

From several sections of the country we are advised that general contractors on public work have made deals with all sub contractors whereby the general contractor buys all the materials, pays all the mechanics and takes over the shop and field generalship. The contractor assumes the place of an interested, but unresponsible, onlooker.

General contractors have been trying to establish this practice for several years. They have been successful with some trades, but they have never been able to extend their rule over the sheet metal, ventilation and roofing trades. No doubt about it, this failure has irked the general contractor.

This year the general contractor has found conditions exactly to his liking. Many of these public jobs require broad guarantees and carry heavy penalties. Many sub-contractors are short of funds for materials and payrolls and are afraid to tackle large jobs in view of these conditions.

This condition should afford food for thought and some real reasons for the close cooperation of members of local, state and national associations. Associations can help the trades by making such conditions the basis for active leadership.

◆

## Technically Speaking

In the development and sale of every specialty product there comes a time when the technical features of the product lose their appeal and must be superseded by sales points based on comfort, convenience, economy, and pride of ownership.

This sales fundamental has been proved many times by such industries as the automobile, the radio and the oil burner. In the beginning each of these products was sold on its engineering or technical features.

The appeal of technical features lost ground when competition became so general that the public could not possibly absorb all the features presented and when several products carried the same technical features.

It will be well for the wide awake heating man to give some serious thought right now to this sales fundamental. Forced air and domestic air conditioning have to date been sold largely on technicalities. Forced air and air conditioning are still being sold on that basis, but the time is rapidly approaching when these features will fail to appeal and our industry, like the other specialties, will have to make sales on more general consumer appeals—comfort, convenience, economy and pride of ownership.

Success in selling by these appeals also requires another highly important requisite—the establishing of a reputation. This reputation is always based upon two factors—reputation of the product or manufacturer and reputation of the dealer. The manufacturer must guarantee a technically sound product, rightly priced, while the dealer must guarantee correct installation, proper service and favorable public recognition.

Today is none too early to begin the building up of your reputation and the cementing of sound and favorable manufacturer relationships.

◆

## Metal Specialties

In visiting sheet metal shops around the country, we have been surprised at the large number of small specialties these contractors are fabricating. Such activity is tending to make these men manufacturers as well as contractors.

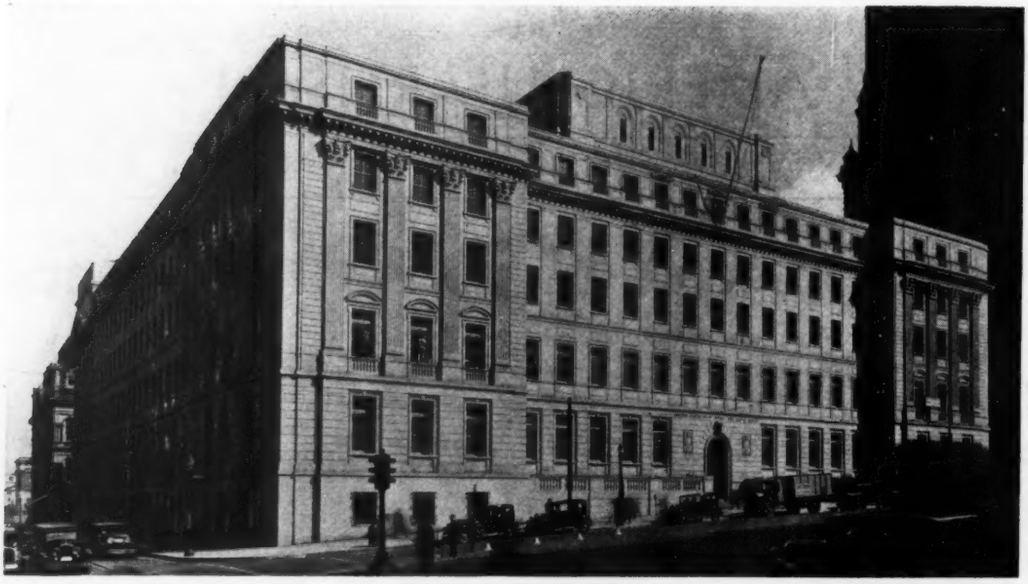
We have met contractors fabricating metal boxes for milk bottle storage, boxes for conveyor systems, boxes to protect outside meters, children's toys, restaurant equipment of many kinds, cans, pails, tanks for the hardware and farm trade, dish washers, boats, and of course the usual metal specialties of our own field.

In most instances this line of work is not full time activity, but "fill-in" work when other fabrication is not going through the shop.

This line of activity is increasing. Inventors and sales agencies are looking for small shops which can make their product on intermittent schedules and in small lots.

Profits, generally, are reported excellent, especially where preliminary development work is undertaken. The aim, usually, is not to sell, but to manufacture for some sales agency.

The contractor looking for profitable shop operations where sales expense is absent should find the specialty right down his alley.



# Copper Protection, Ornamentation, Drainage, On Baltimore Post Office

THERE has recently been completed in Baltimore, Maryland, a post office and court house which is declared one of the most imposing of all public structures in the city. The building faces on four streets and has five full stories and one half basement above the street grade. In addition, there is a sixth floor consisting of attic space lighted by dormers and pent houses.

For the sheet metal industry there is a wealth of interesting details, particularly those metal applications which serve to protect masonry and structural sections. These applications are in accordance with the government's advocation of the very best types of construction and structural design.

### Wall Flashing

The metal work consists of copper and hard lead application in wall flashings, gutters, dormers, and skylights. The entire contract for metal application was secured and carried out by W. A. Fingles, Inc., nationally known sheet metal contractors of Baltimore.

More than 20,000 square feet of mechanically keyed wall flashing was used as protection under all window sills and over all spandrel beams. The flashing used is manufactured under patents by the Fingles company and is known as "Majestic" flashing.

One of the details shows the design and fabrication of this flashing. The pressed bosses are designed to provide mechanical key. In addition to application at sills and spandrels this same flashing was used throughout the parapet coping as shown in one of the details indicated by the letters C. F.

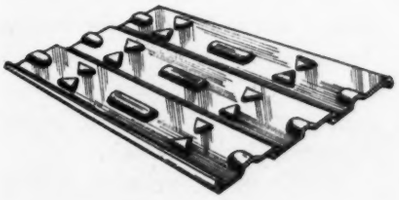
**Governmental construction of public buildings has increased tremendously during the past year, replacing to a noticeable extent private construction which has fallen off. A feature of practically all these public buildings is the high character of the design and the use of quality materials. The Baltimore post office with its thousands of pounds of buried metal protection, quality metal drainage and metal ornamentation is typical of these new specifications**

### Gutters

One of the most interesting metal details is found in the gutters which follow all outside walls. In some places this gutter acquires a girth of 10 feet. One of the photographs shows a typical gutter and shows the construction which is detailed in one of the drawings. More than 900 lineal feet of gutter was required.

The main gutter is fabricated without the use of any longitudinal seams in the bed of the gutter. To secure this construction, cross seams are used at 48-inch intervals. Gutter sheets were cut to secure this construction.

At the back side of the gutter a roof flashing sheet is carried down over the face where it ends in a continuous horizontal loose lock with the gutter sheets. From this seam the gutter sheet is carried over the full width of the gutter to a

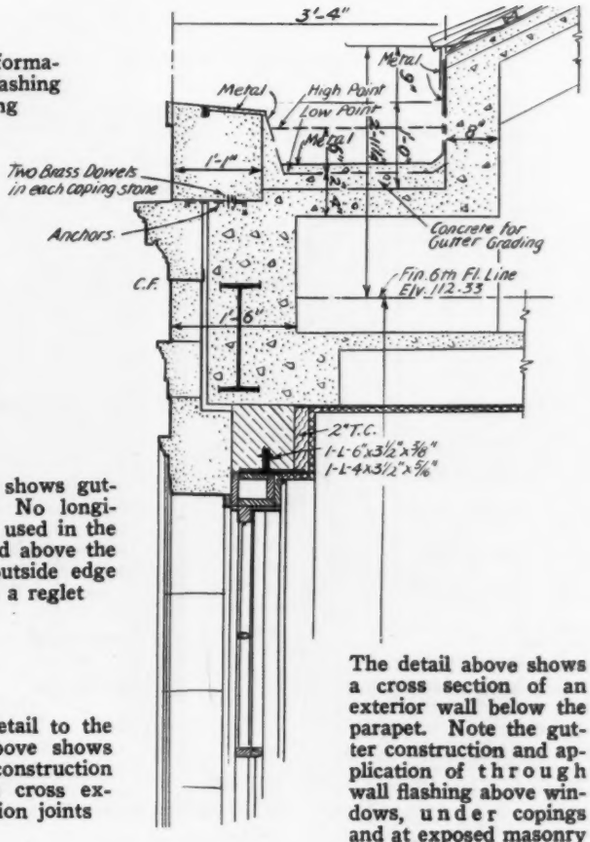


To the left is shown a formation of the Majestic flashing used on the building

point on top of the cornice coping where another continuous loose lock joins the gutter sheet with a narrow sheet which is caulked into a wedge shaped reglet in the stone.

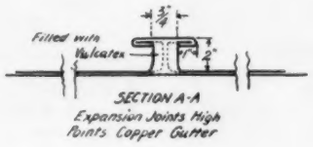
The back side continuous lock is placed high enough on the face to be always above the flow line of the gutter.

A feature of the gutter is the expansion joints used at all high points. These expansion joints are shown in the gutter photograph.

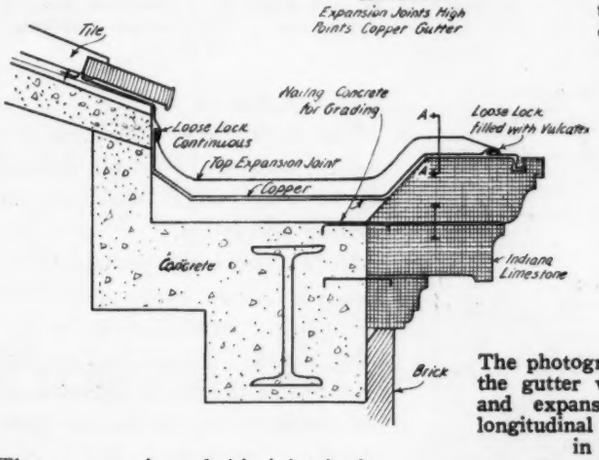



The detail above shows a cross section of an exterior wall below the parapet. Note the gutter construction and application of through wall flashing above windows, under copings and at exposed masonry joints

The detail below shows gutter construction. No longitudinal seams are used in the bed, but are placed above the flow line. The outside edge is caulked into a reglet




The detail to the left above shows the construction of the cross expansion joints




The photograph below shows the gutter with cross seams and expansion joints. No longitudinal seams are used in the bed

The construction of this joint is detailed. The drawing shows that the top of the joint is 2 inches above the gutter bed and provides about three quarters of an inch for expansion. The space between vertical faces of the sheets is filled with a non-hardening compound.

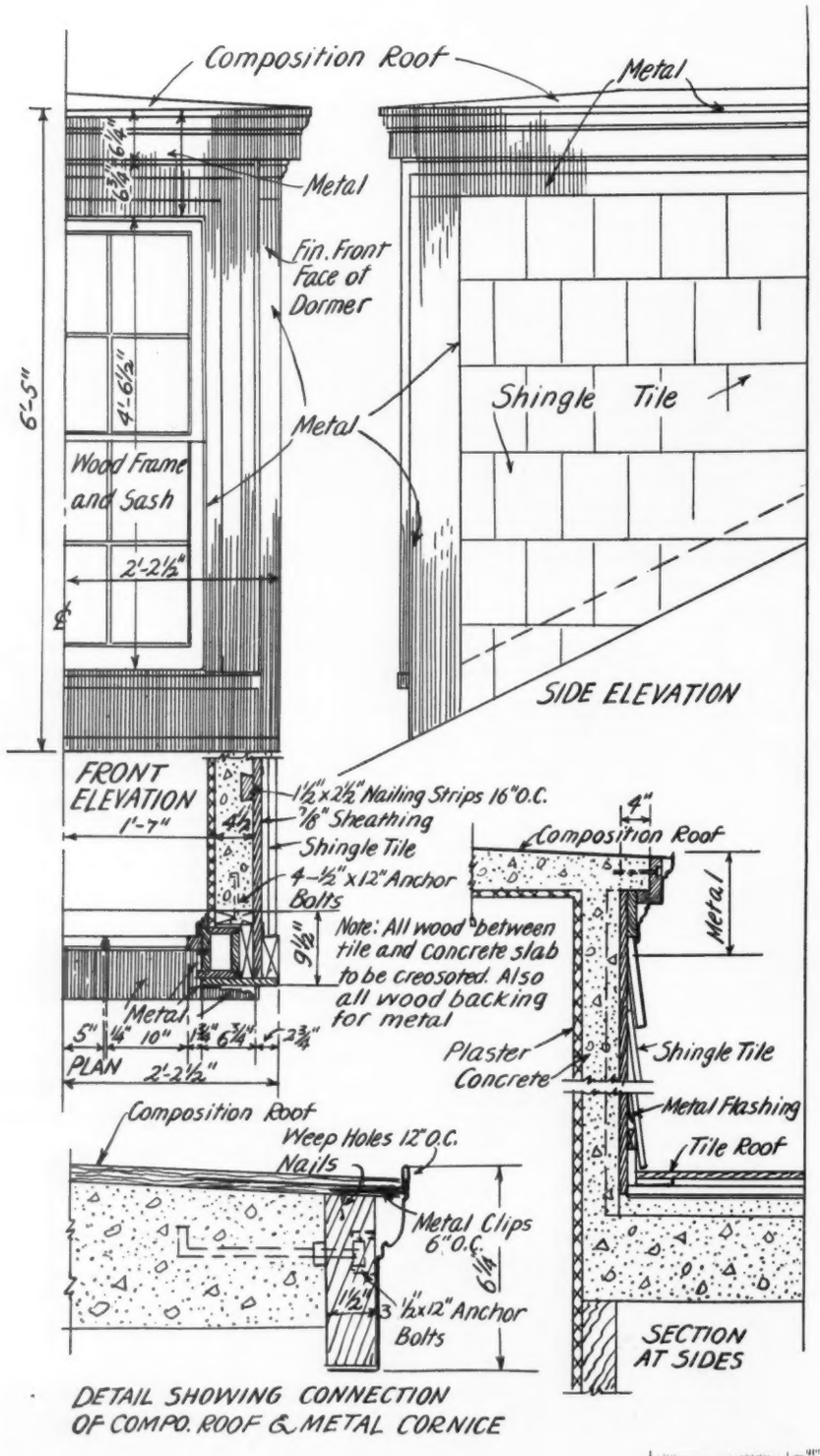
All joints, excepting those discussed are soldered. All gutter sections were formed on the building.

### Dormers

The sixth floor or attic is lighted by dormers which are cut through the tile roof and ornamented with fabricated hard lead. Details of the lead work are shown in the drawings.

The construction consists, briefly, of a continuous cornice forming a gravel stop and a lead face which is carried around the two front corners forming a pilaster which supports the lead cornice.

All lead sections for these dormers was fabricated in the Fingles shop and delivered at the building ready for locking. No burning was used—instead sliding joints and




DETAIL SHOWING CONNECTION OF COMPO. ROOF & METAL CORNICE

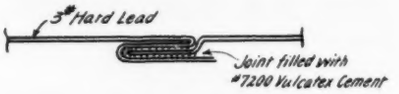
locked joints were adopted. One of the drawings shows this sliding joint which is filled.

The cornice is formed to give a gravel stop at the top and is carried down over the face as a stay which is supported on metal clips placed on 6-inch centers. The cornice ends in a molding course and fascia which covers the shingle tile which, in turn, covers the dormer walls.

A course of metal flashing is used under the top edge of the bottom tile course which, in turn, forms a drip over the tile of the roof. Weep holes are cut through the gravel stop at 12-inch intervals.

The dormer faces consist of a full lead facing which is stepped down to the sash through a series of sunken panels and moldings. The sill is metal covered and the top meets and is locked with the face cornice. Suitable wood framing to carry this metal face was provided and is shown in one of the dormer details.

Under the sill a plain face and flashing drip is used as shown in the roof photograph.




DETAIL SECTION
Expansion Joint used. Dormer Mouldings Cornice

**A slip joint of this type was used on all lead sections to eliminate burning and prevent future trouble. The joints are filled**

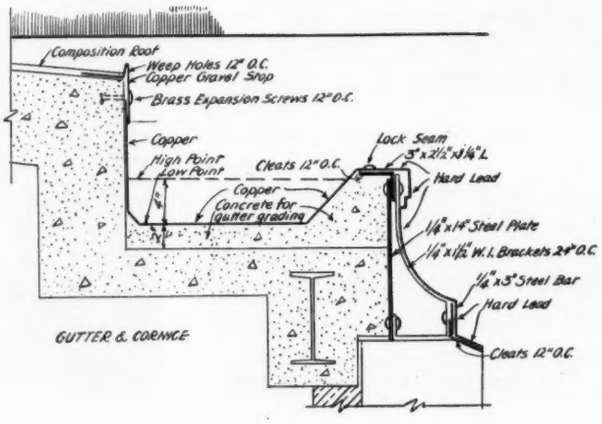
The sliding lock (indicated in a detail) was used for all dormer seams. This joint is filled for penetration prevention.

More than 7,000 pounds of 3-pound hard lead were required for the building. In addition to the dormers, there is a hard lead cornice of the same design as that used on the dormers applied to the pent houses.

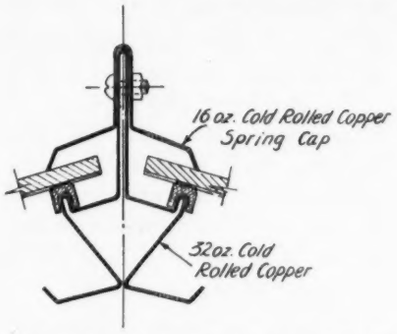
## Skylights

Twenty-six puttyless, copper skylights of various sizes were required. These were all manufactured by the Fingles company under the trade name of "Majestic."

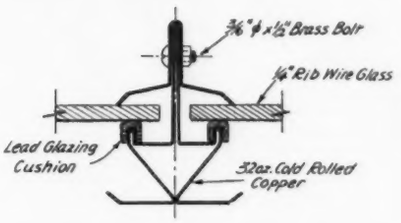
**The details above and to the right show fabrication and application of the lead work on dormers and a cross section of the pent house gutter. All lead sections were formed in the Fingles shop**



**There are 26 Majestic copper skylights used on the building, most of them are on this roof above the third floor court rooms**

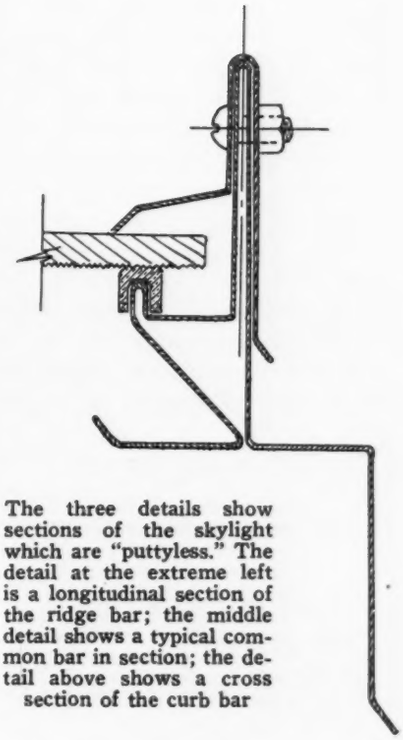



These skylights are located on the roof above the third floor court room.




The skylights have louvres in both ends as shown in the photograph. Details of the glass application are shown in the drawings.

Some idea of the extent of the



**The three details show sections of the skylight which are "puttyless." The detail at the extreme left is a longitudinal section of the ridge bar; the middle detail shows a typical common bar in section; the detail above shows a cross section of the curb bar**

building is indicated by the roof which required 42,000 square feet of tile and a similar footage of roof insulating material. All composition roofing work, including the application of the insulating material and waterproofing were a part of the sheet metal contract.

# Program National Warm Air Ass'n Meeting

The National Warm Air Heating Association will hold its next Convention December 7-8, 1932 in the Urbana-Lincoln Hotel, Urbana, Illinois.

### PROGRAM

**Wednesday Morning, December 7**

President Jones, Chairman.

8:30 A. M.—Registration starts.

9:30 A. M.—Call to Order.

Remarks by our President.

9:45 A. M.—Welcome. H. W. Chase, President of the University of Illinois.

10:00 A. M.—Research Advisory Committee Report. F. G. Sedgwick, Chairman.

Resume of the Research Work during the summer and fall. A. C. Willard.

11:00 A. M.—Inspection of Research Residence and present installations.

Note: The Mechanical Laboratory of the University is also open to visitors. The Research Residence will be closed during the convention session hours but open before and after each session.

**Wednesday Afternoon, December 7**

Vice President McGrath, Chairman.

2:00 P. M.—The Mechanical Code for Warm Air Furnace Heating Systems in Residences and Code Committee Report. J. D. Hoffman, Chairman of Code Committee and Director of Dept. of Practical Mechanics, Purdue University, Lafayette, Ind.

2:30 P. M.—Research. Research Work of the Engineering Experiment Station of the University of Illinois. M. S. Ketchum, Dean of College of Engineering and Director of the Engineering Experiment Station.

Presentation of Recent Research Developments.

A. P. Kratz, Research Professor of Mechanical Engineering. S. Konzo, Special Research Associate.

4:30 P. M.—Automatic Control Applied to Warm Air Heating and Air Conditioning Systems. G. D. Kingsland, Minneapolis, Minn.

5:00 P. M.—Recess.

**Wednesday Evening**

W. L. Rybolt, Toastmaster.

7:00 P. M.—Banquet Dinner. All invited and expected. Urbana-Lincoln Hotel.

**Thursday Morning, December 8**

Vice President Richardson, Chairman

9:30 A. M.—Results of Tests on Gravity Warm Air Furnaces to Determine Comparative Operating Characteristics with and without Air Filters.

Tests by Frank B. Rowley, President, A. S. H. V. E., Director Experimental Engineering Laboratory, University of Minnesota.

Presentation of Report by D. C. Simpson, Columbus, Ohio.

10:00 A. M.—Open Forum for Discussion of Business Management in our Industry. 1. Sales Methods. 2. Installations. 3. Profits. 4. Collections. 5. The Situation and Outlook.

11:00 A. M.—Reports of Officers and Committees. Report of Nominating Committee and Election of Officers.

11:30 A. M.—New and Unfinished Business.

12:00 Noon.—Adjournment.

# FAN PHYSICS

[Part I]

By Platte Overton

ANY series of articles on mechanical heating which fails to discuss the fan, is akin to an essay on the automobile which omits all mention of the engine.

We believe that this subject of the fan is timely. Many contractors have the idea that they can manufacture their own fan, and in some cases they also consider the possibility of manufacturing for other contractors also.

The writer recently called on such a contractor who was manufacturing a small centrifugal blower for "forced air" and air conditioning systems. This contractor stated that this blower would deliver 4,000 cubic feet of air per minute. Now any one who understood fans could see at a glance and at twenty paces that it would do well to move more than 700 c.f.m. He was selling these blowers to builders, home owners, and some other contractors. The general workmanship was mediocre, and the design would have caused Prof. Carpenter to have a delirium.

When he asked an opinion regarding this masterpiece, I evaded the question and launched into a discussion on automobiles during which I stated I once had a "T" Model Ford car that would do 100 miles an hour. This "fan" designer immediately promoted a discussion on "piston and cylinder displacement" and proved me a technical liar of no mean ability. This was my opening and we went to the mat on fans.

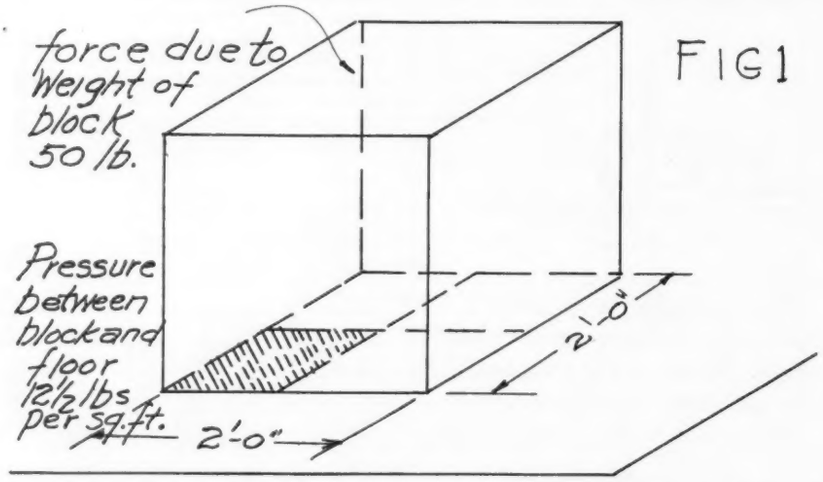



FIG 1

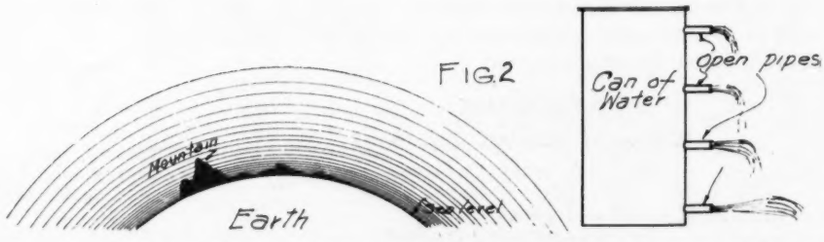
**"Gravity pull" is really weight—that is, if this stone weighs 50 pounds the earth exerts a 50-pound pull on the block. At the same time the "pressure" of the block is the weight per unit of measure, in this case 12½ pounds per square foot**

Now the foregoing words may seem to do nothing except legitimately provoke the comment: "Well, what of it?" and the answer, "Let's know what we are doing" may hardly be termed a revolutionary theory.

It is possible to drive a car with practically little or no knowledge of the internal combustion engine, but one must admit that the driver who understands his gas engine is to be preferred. It is also possible to conduct a successful air conditioning contracting business without knowledge of the mechanics involved in the design of a centrifugal blower, but one must also see that the contractor who knows his "fan stuff" would never fall for the 4,000 c.f.m. blower that couldn't deliver.

The contractor who insists on the design and manufacture of fans, washers, filters, heaters, etc., is another matter. He *must* know. We call his attention to the following articles, and trust that they will be of interest to others as well:

**"A b.t.u. is a measure of energy."** What do we mean by "energy?" "Forced air heating." What do we mean by "force?" "The fan required a ¼ Horse Power motor." The draft gauge showed ¼ inch static "pressure" loss. What is meant by "horsepower," "pressure?"




**To understand atmospheric or barometric pressure remember that any column of air exerts a pressure in proportion to the column height. Water does this, also, as shown by the can with spouts**

We are referring of course to all these words in their technical sense. They are often bandied about by heating men. While it is beyond the province of this article to go into the abstruse mathematics of the subject, various of these items will be discussed briefly because understanding of their technical sig-

nificance is essential to the intelligent study of heating, ventilating, and air conditioning, and its various appurtenances.

**"Force"** is a push or a pull. It is anything which has a tendency either to impart motion to a body at rest, or to change the uniformity of the motion. The body itself may be stretched, compressed, twisted, or bent. In any event "force" will be required to make the change. The most common force is that due to gravity and is called weight. If a stone weighs 12 pounds, this means that the earth pulls on it with a 12-pound pull.

**"Pound"** is a unit for measuring force..

**"Pressure"** is force per unit area—the intensity of force at any point on the contact surface is called the "pressure." The term pressure is generally used only for fluids or gases. However, there are certain kinds of solids such as sand, soil, grain, etc., that act very much as liquids or gases.

The numerical expression of a pressure is obtained by dividing the total force which produces the pressure by the number of area units in the surface over which the total force is uniformly distributed.

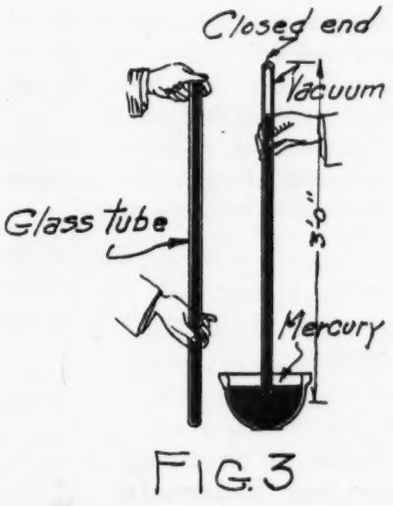



FIG. 3

**Atmospheric pressure can be measured by water or mercury, but mercury is preferred because it is heavier and so does not change height through so wide a range**

(Fig. 1.) Thus we say pressure per sq. ft., or per sq. inch, etc.

**Formula (a)**

The formula is $P = \frac{W}{A}$

where: **P** = the pressure, expressed numerically in the given unit of weight per assumed unit of area

**W** = the total load or force, expressed in any assumed unit of weight, which is applied to produce the total load or force

**A** = the total surface, expressed in any unit of area, where on the total force is uniformly distributed.

Example:—A quantity of grain is poured into a bin. The bin is 8 feet square, thus the bottom is $8 \times 8 = 64$ sq. ft. The grain weighs 5 tons, thus five tons pressure or force is imposed on the floor of the bin. Hence using formula (a) we have $P = \frac{W}{A} = 5 \div 64 = 0.078$ tons per sq. ft. or $0.078 \times 2000 = 156$ pounds per sq. ft.

**"Atmospheric pressure"** is the pressure exerted by the earth's atmosphere. It is said to be 14.7 pounds per square inch at sea level at 32 degrees F. The higher we go in the air the less the pressure. We may compare the pressure of the earth's atmosphere with the water in the tank in Fig. 2.

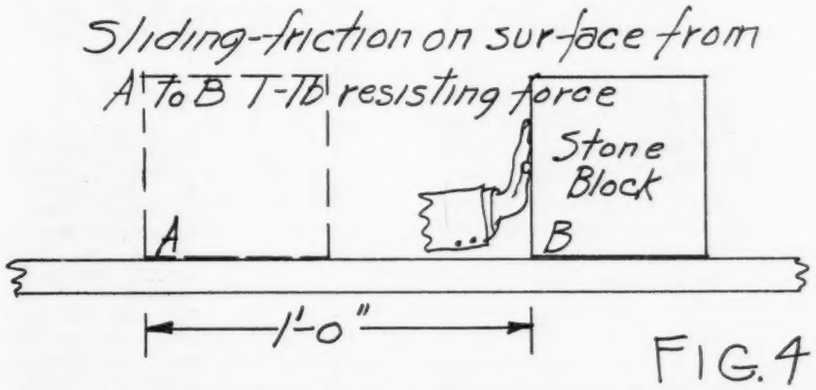



FIG. 4

**"Work" can be illustrated like this. The amount of work done is found by multiplying the weight by the distance. Here we move 1 pound 1 foot, so do 1 foot-pound of work**

Atmospheric pressure can be measured in several ways, but is generally expressed in "inches of mercury." (Fig. 3.) Fill a glass or porcelain dish about half full of mercury. Now fill the glass tube with mercury and invert it in the dish, holding the thumb over the open end until it is below the surface of the mercury in the dish. When the tube is held vertically the column of mercury therein will fall away from the closed end. The space above will be a vacuum. Thus the pressure above the mercury will be zero, or none. The pressure on the surface of the mercury in the dish will be atmospheric or normally 14.7 pounds per square inch. Such an instrument as we have constructed is called a barometer. Pressure which is read on a barometer is called "barometric reading" or "barometric pressure."

As the atmospheric pressure drops, the surface of the mercury in the dish will rise and the space in the closed and upper end of the tube will increase. A low atmospheric pressure is generally a sign of a storm and we read in stories of the sea that sailors speak of the "glass falling" which indicates the approach of a high or low wind storm depending on the extent of the lowering of the pressure.

The common chicken watering can is an example of a crude barometer. We might construct a barometer as in figure 3 and use

water in place of mercury, but as mercury is 13.6 times as heavy as water we would require a tube $13.6 \times 30 = 408$ inches long. if this were possible such an instrument would give readings quite observable for very slight variations in pressure.

**"Work"** is the overcoming of opposition through space. When anything is moved, work is done.

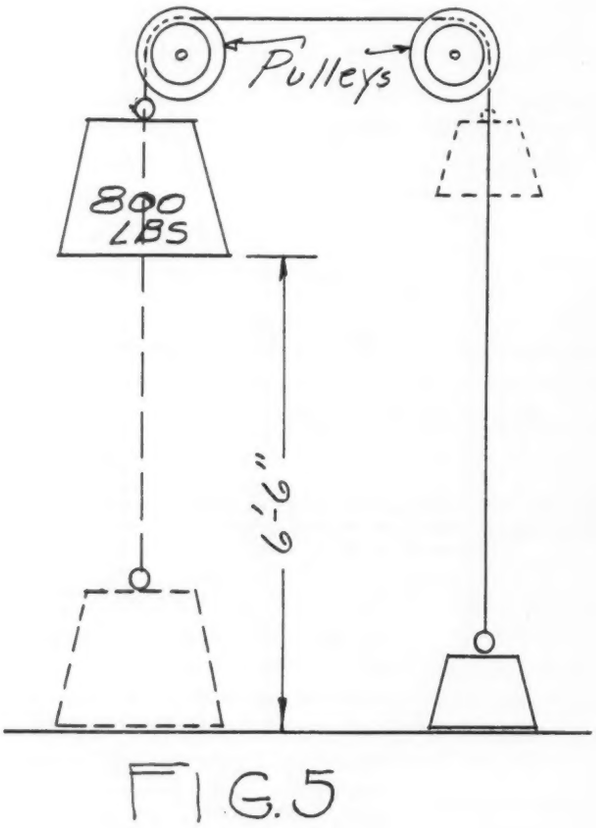



FIG. 5

**Here we illustrate "energy." There are two kinds—"kinetic," which is energy which is in use, and "potential," which is energy which can be used but has not been put to work. Energy appears in many forms — mechanical, chemical, electrical, heat, etc.**

The unit of "work" which is used most frequently in this country is the **foot-pound.** A foot-pound is the work done when a 1-lb. force is overcome through a distance of one foot (Fig. 4.).

### Formula (b)

To compute the work done in overcoming force through distance, two factors must be known: (1) The applied force; (2) the distance. The distance, of course, must be measured in the direction of the force. The formula is

$$W = FL$$

where **W** = the work, expressed in the assumed unit terms of the force and distance

**F** = the force, expressed in any assumed unit of force

**L** = the distance, expressed in any assumed unit of length.

**"Energy"** is capacity for doing work, or ability to do work, or stored work. Any body due to its position or state capable of doing work is said to possess energy. Thus a weight suspended in the air has energy. If it falls to the earth it does work or can do work. (Fig. 5.)

However, work must be done on the body (in our case the weight) to change its state or to place it in position whereby it possesses the capacity for doing work. In other words, we must work to get it up to the position where its energy may be converted into work.

There are fundamentally two kinds of energy—"kinetic" and "potential." In figure 5 the weight has "potential" energy. When it starts toward the earth and is pulling up the lesser weight, the energy is changed from "potential" to "kinetic." A hammer poised above a nail has potential energy that is changed to kinetic energy when it leaves from the highest point of arc of the upper swing and descends on the nail.

Energy may be further divided into mechanical, chemical, electric, radiant, and heat. It may be transformed from one kind to another. Thus the B.t.u. in coal may be transferred to heat, then to steam, then into mechanical energy of the steam engine that in turn transfers it into electrical energy through a dynamo, and may then be reconverted back to heat through an electric heater. The study of the transformation of heat energy is termed "thermodynamics."

The coal may be said to contain "Internal" or "Chemical" energy. Combustion, or the burning of the coal may be called a "chemical reaction." No chemical reaction can occur without liberating or absorbing energy. Combustion is a chemical reaction liberating energy; thus we have "heat energy" or "heat."

*Note—It is impossible to create energy or destroy it. The amount of energy in the universe is always constant.*

**The purpose of this article and the one which follows is, frankly, to discourage haphazard assembly of fans by contractors who do not know even fundamental physics. It is apparent that fans in the future must deliver rated capacities and only soundly engineered and designed fans can do this.**

OPEN for DISCUSSION

**Readers are invited to contribute their experiences or suggestions to the topics under discussion or to submit problems on which they wish discussion. Sketches showing your ideas are desired.**

# Selecting the Thermostat Location

IN the June issue, Platte Overton presented a discussion of thermostatic control and pointed out how impossible it is to control temperatures in some types of houses with one thermostat.

This question of controlling temperatures with a single thermostat will become more acute as forced air systems become more widely accepted. The reason for this is that the home owner will expect uniform comfort in all the rooms of his house and will not accept alibis in lieu of comfort. This demand for uniformity of temperatures, regardless of architectural design, will make it necessary for the contractor to choose his thermostat location very carefully or resort to the use of more than one thermostat.

In order to make this discussion as complete as possible we selected an average, two-story house, reasonably compact, with typical wall spaces and sent floor plans to a number of readers in all parts of the country. We asked readers to show on these plans just where they would place their thermostat and to indicate whether they considered more than one control necessary.

The master floor plan shows the locations selected by nine readers. Why they selected these locations and what factors guided them in their choice follows:

### Arthur W. Hunt, Kansas City

From Arthur W. Hunt of Hunt Brothers, Kansas City, we received a very brief letter and the choice of one thermostat located at position number 1. Mr. Hunt says —

**"A house of this size, and laid out so well for even heating, would lead us to use one thermostat, located in hall, as marked by number 1.**

**"After reading Mr. Overton's article of June, I can think of nothing he did not mention. It was a fine explanation of temperature conditions in a home."**

### F. G. Sedgwick, Minneapolis

F. G. Sedgwick of the Waterman-Waterbury Company, Minneapolis, and Chairman of the Research Committee of the National Warm Air Heating Association submits an excellent discussion and the choice of two locations designated as 2A and 2B. Mr. Sedgwick says—

**"Personally, I do not see how two thermostats can be used to advantage. We have never used that sort of a hookup.**

**"In general I think that the thermostat should be located, first, in a place where it will not be directly heated by the heat from a warm air register; second, in a place where it will not be directly affected by sunshine; and, third, in a room and in a location where the greatest fluctuation of temperature can be expected.**

**"In other words, the thermostat should be located at a point which will make the fan operate as frequently as possible.**

**"The plan is a particularly difficult one for the location of one thermostat. Assuming that the house faces south, the sun room has a south and east exposure, the ideal location for the thermostat is, in our opinion, in the sunroom, and yet the inside wall space of the sunroom is so taken up with registers and fireplace that it makes it difficult to select a desirable location.**

**"If the fireplace is not to be used during the heating season, the best location, in my opinion, is the one which I have marked 2A, but if the fireplace is to be used, then the best location is the one that I have marked 2B, and in this case, I would suggest that it would be well to build the thermostat base out an inch or inch and a half into the room.**

**"It is customary to locate thermostats at the breathing level, or approximately 5' above the floor level. I think a location of 3½' to 4' would give better results."**

### G. A. Voorhees, Indianapolis

From G. A. Voorhees, Indianapolis, comes a typically thorough analysis and the selection of position 3E and elimination of positions 3A, 3B, 3C, and 3D. Mr. Voorhees says—

**"There are so many variables affecting thermostat location that it's hard to offer suggestions. The plan does not show points of the compass. The direction of the prevailing winds and of the coldest winds will also affect location of the instrument.**

**"In a house of this size, I usually specify only one room thermostat. In larger houses where more elaborate systems are installed, I like to use several. On one job recently sold by a local firm, I specified six room thermostats in various parts of the three story house, the control being effected by mixing dampers operated by thermostats.**

**"In the present problem, when we eliminate outside walls and inside walls near supply registers and wall stacks,**

the possible locations would seem to be those indicated by letters on the accompanying plan.

"Position 3A is not good because (even if all other conditions were favorable—which they are not) the heat of the chimney would affect the instrument.

"3B is a logical piano location. I find that it is well to discuss probable furniture locations with the owner; otherwise floor lamps or table lamps may be so placed as to affect the thermostat.

"3C is liable to be subjected to drafts.

This leaves the dining room as the probable best location. At 3D the instrument is liable to be affected by a current of warm air from the register near the rear of the room. 3E would seem by this process of elimination, to be the logical location.

"Where only one thermostat is used, I don't like any second floor location, although I sometimes see it done.

"In a residence I prefer to place the instrument about thirty inches above the floor. The customary breathing line location is illogical and impractical."

### B. F. McLouth, Toledo

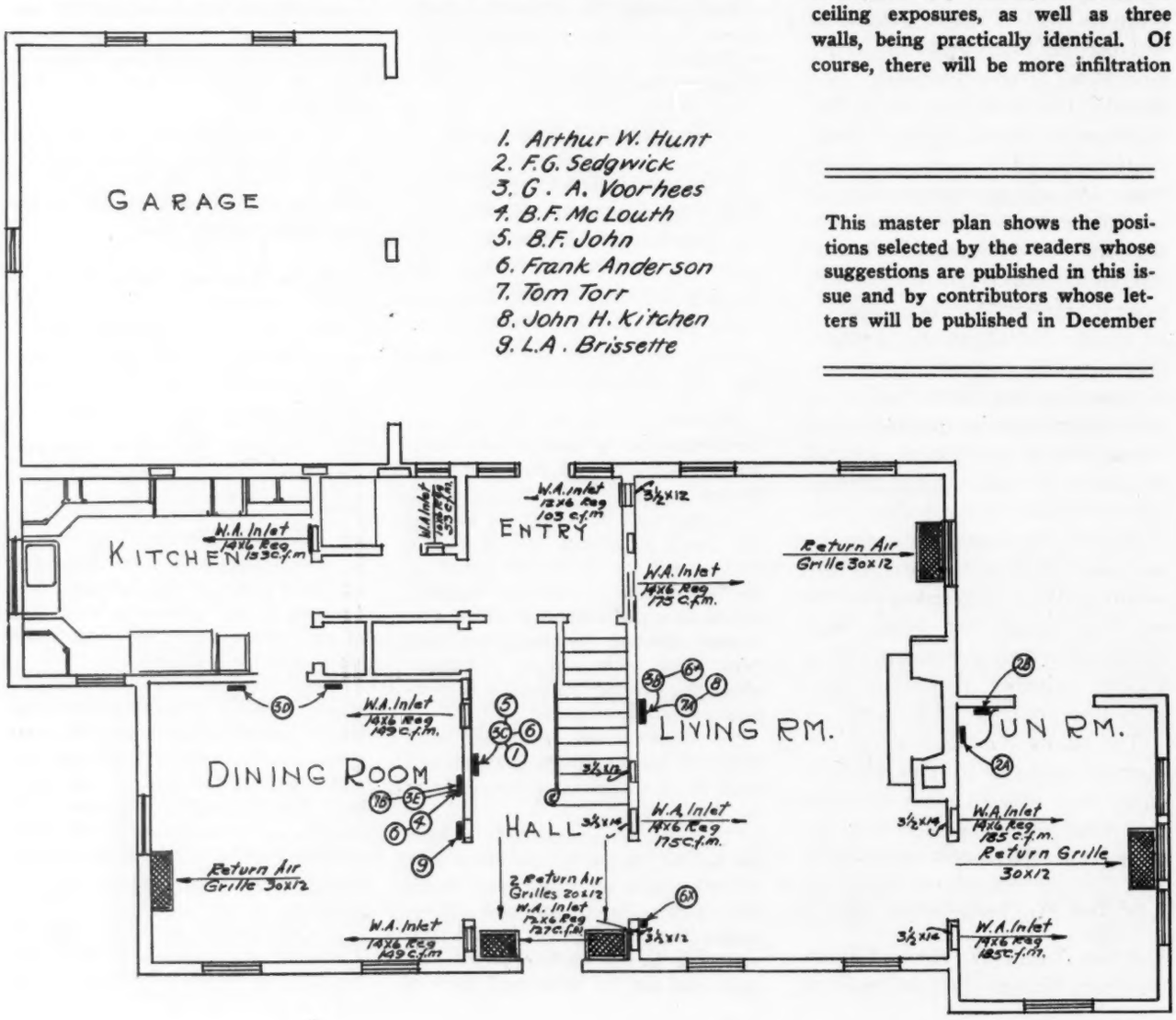
B. F. McLouth, engineer for the Schmidlin Brothers Company, Toledo, Ohio, selects positions 4A and 4B and says he would use two thermostats for this house. His suggestions are as follows—

"The plan is one very similar to several jobs we have installed with a single thermostat, with considerable misgivings. The owners were satisfied, but I was not, as there was a variation of from four to five degrees in the temperatures of the sun room and the bedroom over the garage. Of course, this condition was really not so bad, but it could have been prevented entirely, by placing extra thermostats controlling dampers in the ducts, as well as the drafts.

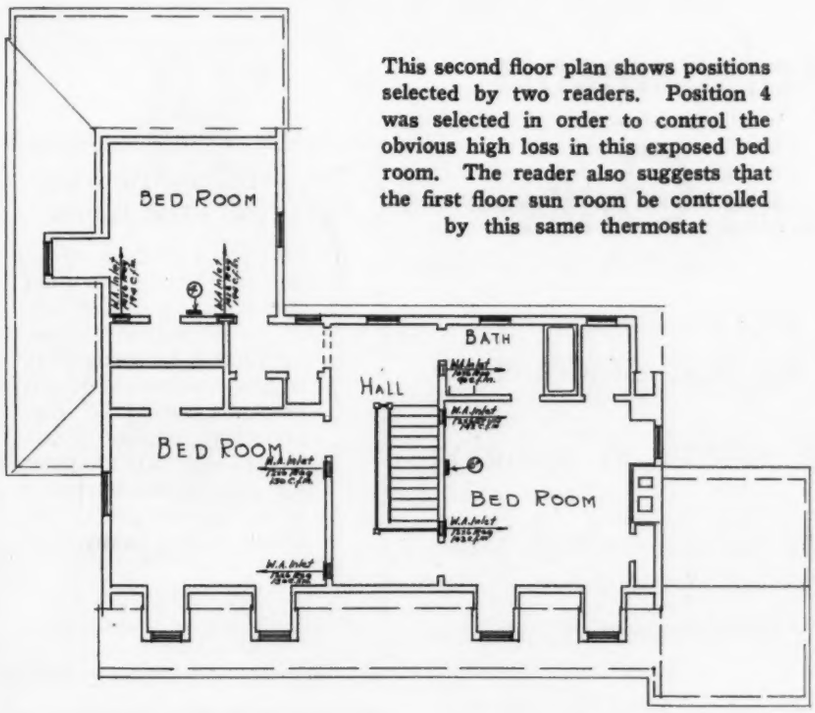
"Not knowing in which direction the house faces, it is difficult to say in which room the master thermostat should be placed. If the house faces north or west I would place it in the dining room; if south or east, I would place it in the living room.

"I have shown the location of the thermostat in the bedroom over the garage, but the best location for the thermostat in the sun room presents a real question. It is not advisable to place it over either of the warm air grilles or against the mantel, as the heat transmitted to these points will cause a variation of several degrees from a true recording. Still it is impossible, or nearly so, in my estimation, to successfully put a thermostat on the outside wall, regardless of how well that wall may be insulated; transmission of heat through the building materials will cause registration a few degrees low.

"I believe you could leave the thermostat out of the sun room entirely, controlling the sun room from the bedroom over the garage, as the exposures, although on opposite sides of the house, are very similar, the floor and ceiling exposures, as well as three walls, being practically identical. Of course, there will be more infiltration




This master plan shows the positions selected by the readers whose suggestions are published in this issue and by contributors whose letters will be published in December




This second floor plan shows positions selected by two readers. Position 4 was selected in order to control the obvious high loss in this exposed bed room. The reader also suggests that the first floor sun room be controlled by this same thermostat

in the sun room. If you control the sun room from the master thermostat a variation of temperature is bound to result, due to excess infiltration and exposure of the small sun room, as compared with infiltration and exposure on the balance of the house.

"Each thermostat should control the heater unit and each thermostat should also control a damper or dampers leading to the rooms served by that thermostat.

"We have not installed multiple thermostats in any houses of this type, but I assure you that it would be much more satisfactory to place two thermostats as shown on the plans I am returning to you (marked 4A and 4B) than to have one thermostat to control the entire house."

### B. F. John, Philadelphia

In Philadelphia, B. F. John has done some excellent forced air work and has established himself in mechanical heating. He selects position 5 because—

"From experience, after measuring the enclosed prints, one thermostat located in the first floor hall, on the wall opposite the stairs and midway between the two heat stacks to second floor, to prevent these heating the thermostat, at the point marked on the plan as 5, would be most effective because:

"1. The room heating design is excellent as there are two registers in each room except kitchen and bath and the c.f.m. from each register under 500 V. indicates easy and full heating in the proper manner and at normal firing in all weather. Heat registers are placed near the cold ends of the rooms. Return air grilles at the exposed walls opposite and at the door. And if the balance of the system is of the same excellent design, the heat will easily and quickly spread through the entire area of the room in fan shape before being drawn into the returns, and the outside walls will be heated first, which is proper.

"2. The location, marked for the thermostat, has the minimum velocity of cold and warm air current. The cold air at the two outside doors being taken care of by the heat registers placed at the doors and the return air down the stairway from the second floor will follow the straight pull to the returns at the front door. The warm air inlets, at the doors from the living room and dining room to the hallway, prevent cold air drafts to the hall from the two windows in the living room and dining room near these doors.

"It is, therefore, reasonable to suppose that the hall position for the thermostat will indicate the average temperature of all rooms with the possible exception of the extreme rear second floor bedroom, if this is the north or prevailing wind side of the house. However, this may not be really cold due to the two heat registers.

"With the thermostat set at 68 or even 67 degrees all rooms should be comfortable, assuming the introduction of humidity at about 30 per cent. The house has less than 18,000 cu. ft. and its main section, the first floor and second floor hallway, is within easy reach of one thermostat.

"It would be interesting to see a check on room temperatures in this house with the thermostat set at 68 degrees in severe weather and the fuel cost as much could be determined about thermostat action from this well designed system."

### John H. Kitchen, Kansas City

John H. Kitchen, Kansas City, Missouri and author of the article on cooling in his own home, makes a one-location, one-thermostat selection indicated by number 8. His letter states—

"I do not consider the house shown on the plan large enough to warrant the use of more than one thermostat.

"I would locate the thermostat in the living room as indicated on floor plan at point 8. This room is large and is exposed on three sides. It must also be remembered that the dining room, living room, and sun room will heat virtually as one room because of the cased openings connecting these rooms and the distributed return air grilles.

"The indicated location of the thermostat satisfies these requirements as follows:

1. Thermostat should not be mounted on a cold outside wall.
2. Thermostat should not be located in path of warm air supply.
3. Thermostat should not be placed adjacent to any warm pipes in the inside partitions.

"We have used two thermostats to advantage in much larger houses than the one shown on the plans. The guiding principle in such cases is to locate each thermostat in some "key" room which will heat as an average of all the rooms controlled by that thermostat.

"It is important that the thermostat be located so that it is not in a room adjacent to one in which the heat supply is governed by some other thermostat, unless a thermostat is provided for every room in the house.

"In my own home, of larger size, and with unusual glass exposure as compared to cubic contents, we have found one thermostat is ample, using gas fuel. Why, therefore, use more than one? Automatic controls may be multiplied to a point of increased cost and no special gain."

[*To be continued*]

# To Sell Replacements of Registers and Grilles

A campaign designed to give practical assistance to the furnace dealer in securing a hearing on replacement sales—which will, of course, give him opportunities to introduce other products as the needs of his prospect may indicate . . . . . .

UNQUESTIONABLY we are moving back to fundamentals in selling—more and more and more of the frills are being eliminated. Complicated sales plans have little place today in the scheme of things. The retailer's effort must be to find the shortest possible line between the product and the prospect.

Of course, in a field like ours, there has always been a special obstacle. We don't sell heating equipment, take one example, every day in the week to the same prospect. He doesn't come into our store regularly to buy a little bit of heating for this evening at home, as he or his wife go into the grocery store and buy food for one evening. Our products are purchased at long intervals—and then frequently only when the need for them can not be escaped.

Our hope of keeping volume up, therefore, lies in getting the prospect to see our merchandise more often than he does so that he may become conscious of the fact that what he has in his home is out of date both in appearance and in efficiency. If we have a store display, we try to get him to come in occasionally so that he will see what we have to sell. But that isn't often enough.

The next thing, therefore, is to take the merchandise to him. Of course, we don't want to load a furnace on our backs and trot it around—but we can select an item that has a relatively low sales price, which can be taken to the home easily. From the initial point of interest it is not then too difficult to find out other heating needs. At the same time, the main point of the call should be to sell the merchandise that is being demonstrated.

**In the right-hand column are three small newspaper ads to help out the "hole-in-the-wall" campaign**

**The "Hole in the wall" that heats the home**

Did you ever look critically at the register over the warm air outlet, say in your living room? How long has it been there? Is it good to look at? It can be—and should be. Decidedly, the register should not detract from an otherwise charming room because it is of the clumsy, old-fashioned type.

Phone 1000
ENTERPRISE FURNACE CO.
10 E. Main St.

**An important "Hole in the wall"**

—where the warm air from the furnace enters the room. Is the grille that covers it one that is pleasing to the eye—and at the same time efficient in permitting free circulation of air? Replacements are in order now—at the beginning of the heavy heating season.

Phone 1000
ENTERPRISE FURNACE CO.
10 E. Main St.

**When they knocked a "Hole in the wall"**

—where the pipe delivering warm air from the furnace was to end, they covered it with a grille. How long ago was that? Does the grille in your rooms thrust its way out into the room, with a clumsy pattern in the face of the grille? Replace these old-fashioned warm air heating faces with modern grilles, splendid in design and efficient in air-flow. You can select from a wide variety of designs.

Phone 1000
ENTERPRISE FURNACE CO
10 E. Main St.

# That important hole in the wall under grandfather's picture . . . . . and the grille that covers it.

Of course, they could have left that hole in the wall, where the pipe that carries the heat from the furnace ends, uncovered.

But if they had, grandfather's grandchild might have tried to climb into it,—and might succeed—as he certainly would try chucking his toys down there just to hear the clatter as they slid down the pipe to the furnace.

So they covered the hole in the wall with a grille—how long ago was it? Maybe so long ago that grandfather's grandchild is now a full-grown man. Yet the old grille remains.

Of course, the whole room has been redecorated since then, many times. The furniture has been changed. The horsehair sofa on which grandfather once took his nap of a Sunday afternoon was long ago relegated to the attic. Yet the old grille remains.

But there are styles in grilles, as there are styles in furniture. The last five years particularly have seen many style advances. Naturally, when they decided to make a covering for the hole in the wall, they first made it useful—like the horsehair sofa—useful but not necessarily beautiful. Now they've made those covers beautiful, too. You can have a choice of as many patterns in the openings in the modern grilles as your heart could desire. If you've run to Queen Anne furniture, you can have a grille just as dainty and quaint in pattern as the backs of your Queen Anne chairs. And if you've run to furniture *moderne*, all peaks and angles and surprises, you'll find a grille pattern as modern as the most striking bookcase—or is that a chair?—in the room.

*Here's a practical problem, for instance, that manufacturers of floor registers have been called upon to solve: the prevailing style in women's shoes calls for the high, narrow heel. It has been necessary for designers to keep this in mind—as they have—so that the modern floor grille, while making possible the free circulation of air, at the same time has openings so narrow that the high heel will not be caught in those openings.*

▼ ▼

*And, of course, if you've still got the old wooden floor grilles, you'll want to replace them with metal ones, both for appearance and for safety. Wooden grilles break down—metal grilles last indefinitely, with no danger of collapse.*

**Within a day or two we shall take the pleasure of visiting you, in order that you may see for yourself just what you may have in the way of designs in warm air grilles in order to lend a fresh note to your room. They're really good looking.**

YOUR NAME, ADDRESS AND TELEPHONE NUMBER HERE

**The illustration for the above handbill may be secured from AMERICAN ARTISAN at the nominal cost of 35c. The handbill, it is recommended, should be enclosed in a plain envelope and dropped in the mail box of the home, rather than scattered around in the usual fashion**

There is an existing market for the replacement of registers and grilles. In many a furnace heated home, these accessories have long since outlived their beauty, if not their usefulness. An inexpensive campaign, followed by personal calls, will produce sales of registers and grilles as a beginning, with other sales of material, the need for which will be developed either at the time of the sale of the new grilles, or at the time of their installation.

The difference in this campaign lies in the fact that the way is prepared by either the letter that is given in this article, or by the handbill, or by both. At the same time, there is copy for three small newspaper advertisements, dovetailing with the letter and the handbill, which may be used to give the added value of repetition.

The idea of the campaign is to send to a selected list of names the sales letter, or to distribute the handbill. The letter can, of course, be written by the girl in the office during leisure time. When each letter has been written, the name should be handed to whoever is to make the calls, so that, giving the letter time to arrive, the call may then be made promptly. Thus this grille campaign may extend over a period of weeks or even months, without in any way interrupting any other effort.

The details about the handbill are given on the page with the copy. When it has been printed, we suggest that instead of merely throwing it into hallways, or stuffing it into mail boxes, that each handbill be enclosed in an envelope—you can buy a cheap lot for that use—and dropped into the mail box of each home. This method of handbill distribution is far better than merely scattering them around, because they will be taken from the mail box and read, whereas if they are thrown on the floor, or merely half-stuffed into the box, they are quite likely to be thrown away without a second look.

After the handbills have been distributed, the letter may be used as a follow-up, immediately preceding the personal call. For example, on Monday you may say that on Wednesday you will make a certain number of calls on a certain street in town. On Monday your girl gets out the letters to the prospects on that street. On Wednesday the calls are made, with a sample register taken to each home to make it easier to get a hearing.

On every hand, now, one is hearing about signs that we are definitely on the upgrade. True, these signs are not universal. But the point that merchandising authorities are making about the situation as it exists today is this: It is a good time to make and renew contacts. Even national advertisers who have spent hundreds of thousands of dollars to make the public familiar with their trade mark have discovered that the public will not remember that trade mark indefinitely when advertising is stopped. So, too, with the local retailer. He must in some way keep his name before his community. Nothing can be more effective, of course, than personal contacts. Then, as general improvement progresses, the retailer will not be forced to start at the bottom again in building up a consciousness of his presence in the community.

Plan now to put on this campaign for replacement sales of registers and grilles and carry it through until your entire present list of prospects has been contacted.

My dear Madam:

Will you, just for a moment, glance at the warm air register that is set into the wall of the room in which you happen to be at the moment?

The grille there is important from two standpoints: It masks a "hole in the wall" to which the warm air pipe was led. Therefore, it should be neat in design so as not to detract from an otherwise charming room. The second thing to consider is this: Does your present grille permit a full, free flow of the warm air?

Modern grilles are designed with these two things in mind. No matter what type of furnishings you may have in the room, you can find a grille that will blend in with the "period" represented in your furnishings. And in preparing these modern designs, the manufacturer has kept in mind the fact that he must permit the warm air from the furnace to flow steadily into the room.

Hence, both for appearance and for economy, we urge the replacement of old-fashioned grilles.

In addition to this, let us call your attention to the grille set into the floor. First, is it of wood? If so, we strongly advise its replacement with one of metal. The wood grille must inevitably break down with use and grow weak—a situation you will not want to tolerate, with its menace to safety. Certainly you don't want to have to walk around it every time you pass the place where it is installed. Again--will your present grille catch the heel of the narrow, modern type, causing either a wrenched ankle, or a breaking of the heel?

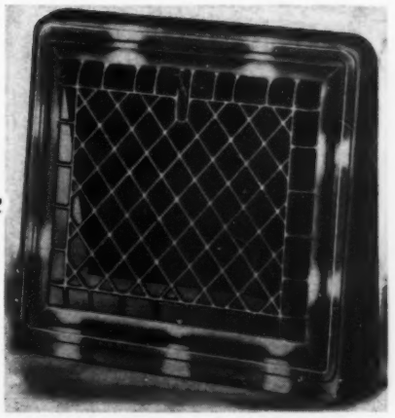
There are so many styles of grilles from which to choose today, each serving beauty as well as efficiency, that we are making arrangements to show you this selection at your home. We will appreciate greatly your giving a few minutes to our representative when he calls--and we know that you will be interested.

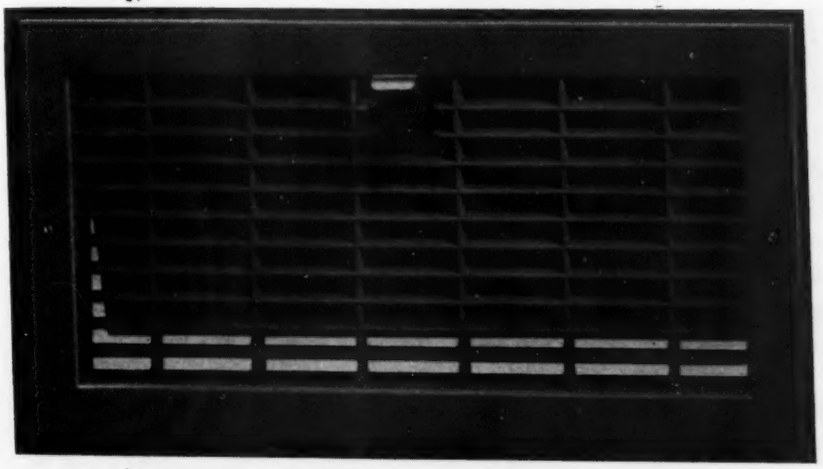
Very truly yours,

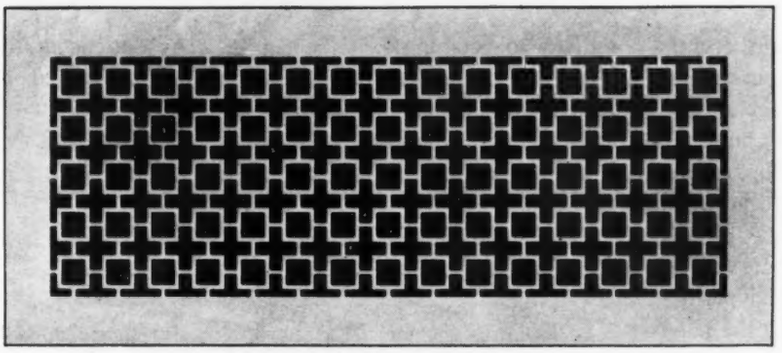
ENTERPRISE FURNACE COMPANY

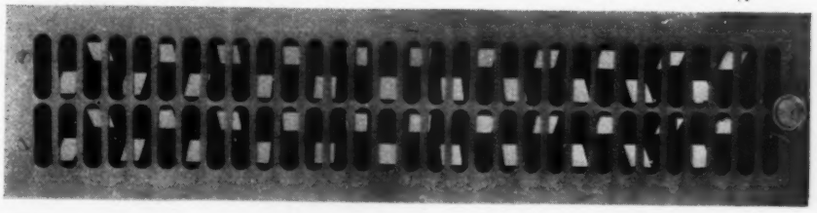
**A sales letter which may be used with the hand bill, or in place of it. We suggest that both be used**

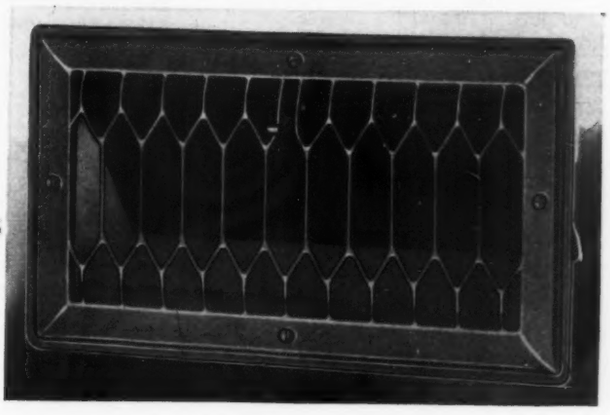
**Here are some of the modern grille faces from which the housewife may be offered a choice during the campaign described on the preceding pages**











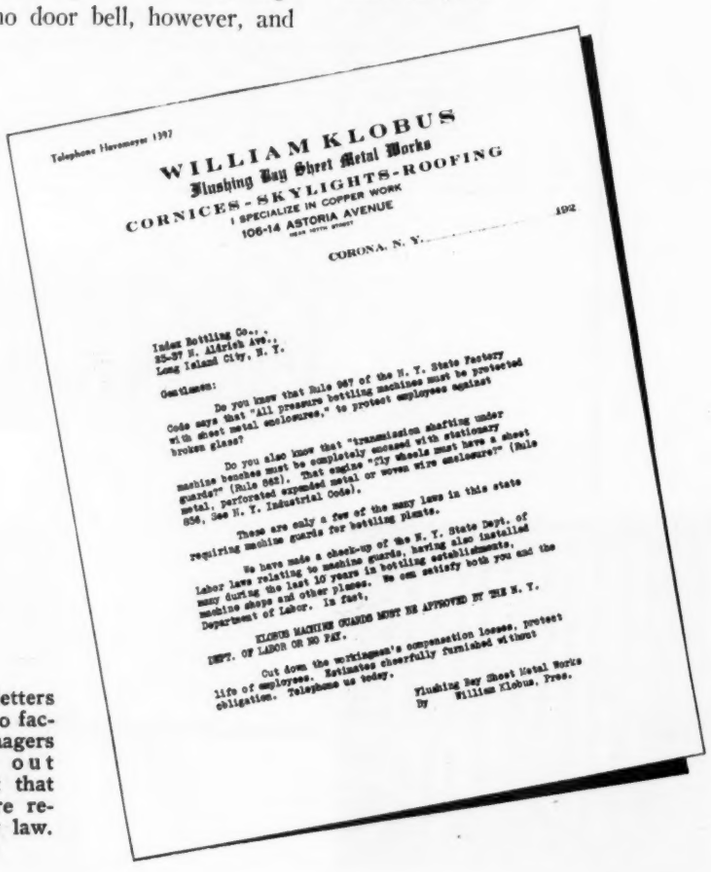
The sheet metal contractor who fails to realize that "fill in" assembly of specialties means profits from an otherwise idle shop has overlooked one of the important lessons of 1932. An excellent example of this trend is the operation of Klobus because—

# Klobus Rings Doorbells For Radiator Cover Sales

TEN years location in the same building is bound to bring any sheet metal contractor a large following of friends who purchase the things he has to sell. In the case of W. J. Klobus, Astoria, L. I., operating under the name of the Flushing Bay Sheet Metal Works, his fine brick building and permanent location of 10 years at the same old stand have meant much more. They have enabled him to build an excellent radiator cabinet business unequalled in his "neck o' the woods."

Regular trade having fallen off during the past summer, Mr. Klobus has been specializing in individually-built cabinets of numerous kinds for concealing steam and hot water radiation. He and his two salesmen are not afraid to ring door bells. They like to do this, in fact, for it means business for them.

In the radiator cabinet selling campaign of the Flushing Bay Sheet Metal Works the first move is to distribute handbills calling attention to the nearness of the shop, the perfection in workmanship, the desire of the contractor to render complete service and the beauty of the radiator covers made. Then, following the handbill distribution, Mr. Klobus and his men go house to house, choosing friends first, neglecting no door bell, however, and by the end of the day each worker has measured numerous radiators and given out prices on a score or more of jobs.



Telephone Havemeyer 1397

WILLIAM KLOBUS
Flushing Bay Sheet Metal Works
CORNICES - SKYLIGHTS - ROOFING
I SPECIALIZE IN COPPER WORK
106-14 ASTORIA AVENUE
CORONA, N. Y. 192

Index Bottling Co.,
35-37 N. Aldrich Ave.,
Long Island City, N. Y.

Gentlemen:

Do you know that Rule 947 of the N. Y. State Factory Code says that "All pressure bottling machines must be protected with sheet metal enclosures," to protect employees against broken glass?

Do you also know that "transmission shafting under machine benches must be completely encased with stationary guards" (Rule 942). That engine "fly wheels must have a sheet metal, perforated expanded metal or woven wire enclosure" (Rule 856, See N. Y. Industrial Code).

These are only a few of the many laws in this state requiring machine guards for bottling plants.

We have made a check-up of the N. Y. State Dept. of Labor laws relating to machine guards, having also installed many during the last 10 years in bottling establishments, machine shops and other plants. We can satisfy both you and the Department of Labor. In fact,

KLOBUS MACHINE GUARDS MUST BE APPROVED BY THE N. Y. DEPT. OF LABOR OR NO PAY.

Cut down the workingmen's compensation losses, protect life of employees. Estimates cheerfully furnished without obligation. Telephone us today.

Flushing Bay Sheet Metal Works
By William Klobus, Pres.

**Form letters are sent to factory managers pointing out the fact that guards are required by law.**

Written confirmations then are mailed to the home-owners who have received the estimates and personal calls by the contractor either bring about acceptances or refusals. Never is a bid left "dangling"; that is, undecided one way or the other.

Another source of cabinet, stove pipe, skylight and other business is hardware stores of which Astoria, Elmhurst, Corona and nearby localities abound. Naturally, commissions have to be allowed to hardware stores who furnish leads and orders, but the sheet metal dealer is glad to carry on this way because the commission profit still comes to him. Mr. Klobus considers stores much the same as salesmen to whom he gives 15 per cent commission payable when the customer has made his first payment.

In addition to radiator covers, another specialty of the Flushing Bay Sheet Metal Works is machine guards. About three miles distant lies Long Island City, area for area said to be the second largest manufacturing center in the United States in number of concerns. In each Mr. Klobus knows there are likely to be several punch presses, open belts, drop forges, wire cutters and other machines that require some sort of sheet metal guards.

Home renovating is another favorite form of activity. Some 3,500 handbills calling attention to the sheet metal contractor's ability to lay new and repair old roofs, repair gutters and leaders, add another skylight. While a great deal of this business reaches Mr. Klobus over the telephone from old customers, he uses an original plan to secure new contracts.

At the conclusion of each job the contractor leaves one dozen visiting cards with the home owner to give to friends. Whenever such card is handed out by the customer he is expected to so advise the contractor, giving him the name and address of each recipient.

If orders are received by the Flushing Bay Sheet Metal Works as a result of the customer's solicitation a suitable reward is given. On orders amounting to less than $50.00 but more than $20.00 a check for $5.00 is tendered. If the contract exceeds $100.00 Mr. Klobus gives the customer who has been the means of securing the business a ton of coal.

**Some 3,500 handbills like the one to the right were sent out to old customers and home and commercial building owners in the sales area served by Klobus. These handbills were followed up by salesman's calls and over the phone**

Now Is The Time To Have
Your Repairing Done By The
FLUSHING BAY
Sheet Metal Works
106-14 Astoria Ave. Corona, N. Y.
PHONE POMEROY 6-1397
Gutters and Leaders put up and Repaired
Tin, Tar, Slate, Asbestos Shingles and
Rubberoid Roofing
Skylights made to Order
Metal Ceilings put up Asphalt Shingling done
ALL KINDS OF METAL WORK
Estimates Cheerfully Given
QUICK SERVICE

**When the repair work fell off, Klobus had handbills like the one to the left prepared and sent out. These were followed up by salesmen who offered free measurement and price quotations on radiator covers. Sometimes as many as 20 bids were made in one day by one man. While the percentage of orders to bids was low, the mere number of calls made brought in a very satisfactory business**

# Stoneham, of Blanketed His Comprehensive

**The Valley shop is a striking testimonial to the firm's progressiveness and belief in advertising. Below is J. B. Stoneham, first manager and now owner**

"BUSINESS men advertise—the others are not business men," So goes the old saying.

Another old saying is: "One thing at a time."

Why not mix the two together and make: "Business men advertise one thing at a time?"

Indeed it would seem that when such "one thing" advertising is served up with some pepper and spice it generally clicks—provided the dish is seasonable.

Take J. B. Stoneham of the Valley Plumbing & Sheet Metal Works, of Phoenix, Arizona, as an example of what the average contractor in an average American city is capable of doing on a sub-normal market, using the above recipe.

Stoneham sells everything in the sheet metal line, of course; his shop displays, for example, the Superior, Equator and Torrid Zone warm air furnaces—and a line of electrical refrigerators. Out on the sidewalk in front are a number of sheet metal garbage incinerators, placed there to halt transients.

Inside, across the entrance of his showroom, is a 16 ft. cat boat, built entirely of sheet metal, shored up, ready to take the water.

But in front of this boat, the first thing a customer sees upon entering the showroom is the latest type air conditioning apparatus complete—all ready to go. Thus Stoneham gives air conditioning the center of the stage, because, as he says, it is the star turn during the long summer season of the year—a big box-office attraction at the moment.

### Brings Customers in

However, he does not wait for customers to come and view his prime exhibit, but takes the story of air-cooling into the homes, offices and stores of his trading area by the only possible means: advertising. Too, his ads are printed in a language which the recipient can understand.

Similar letters go out to restaurants, mortuaries, churches, office building owners who are losing their tenants, tenants who are moving in platoons to the air-conditioned buildings. And whether these letters are addressed to ornate theatres or lowly hot-dog stands, all are backed up by circumstantial evidence and direct proof of the statement that air conditioning will lower production costs in any industry and raise morale and profits.

You understand, of course, that these letters are but the sniping of the campaign. All this is done behind a barrage of newspaper and magazine advertising. Owing to a peculiar local condition the morning and evening papers are owned by the same publishers and no ad is accepted for *one* paper. At about $2.50 per column-inch they publish the ad in both papers (inclusive). A double-barrelled charge, so to speak. Magazine advertising is run in a smaller weekly. Between the three media Stoneham manages to spray his trading area 100% with air conditioning arguments.

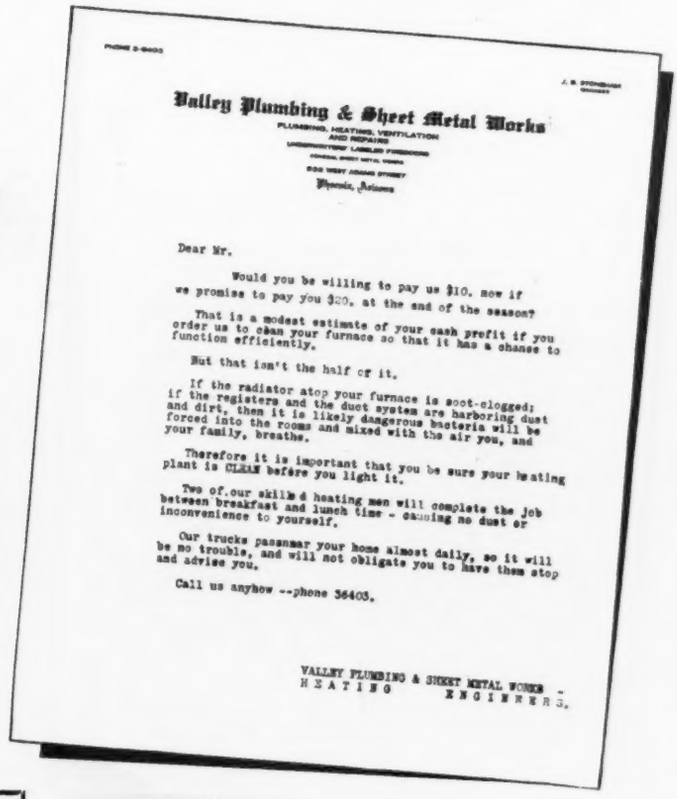
If you are still interested in hearing how this man Stoneham has managed to capture about a dozen jobs during the depression totalling near $150,000.00, this is just how he does it. Instead of sending out batches of letters broadcast he mails one or two at a time, first making a study of each prospect's particular

# Phoenix, Has Trade Area By Advertising

By A. B. Laing

requirements. Then each letter is followed up swiftly by a personal call.

"Usually my letters contain some personal reference, or else they indicate that I am familiar with that person's problems or requirements. So when I call I generally find I am well received. Put another way: my call is in a professional rather than a business capacity."



Valley Plumbing & Sheet Metal Works

PLUMBING, HEATING, VENTILATION AND REPAIRING

532 WEST ADAMS STREET

Phoenix, Arizona

Dear Mr.

Would you be willing to pay us $10. now if we promise to pay you $20. at the end of the season?

That is a modest estimate of your cash profit if you order us to clean your furnace so that it has a chance to function efficiently.

But that isn't the half of it.

If the radiator atop your furnace is soot-clogged; if the registers and the duct system are harboring dust and dirt, then it is likely dangerous bacteria will be forced into the rooms and mixed with the air you, and your family, breathe.

Therefore it is important that you be sure your heating plant is CLEAN before you light it.

Two of our skilled heating men will complete the job between breakfast and lunch time - causing no dust or inconvenience to yourself.

Our trucks passanear your home almost daily, so it will be no trouble, and will not obligate you to have them stop and advise you.

Call us anyhow --phone 36403.

VALLEY PLUMBING & SHEET METAL WORKS
HEATING ENGINEERS.

**Letters are used to solicit all types of work. This particular letter solicits furnace cleaning. The letters are followed by salesman's calls to close the order. Savings in fuel expense is the appeal emphasized**


SPECIALISTS
In Air Conditioning

This Concern specializes in Air Conditioning Work of all descriptions . . . churches . . . schools . . . Industrial Buildings—and mines. This work includes air conditioning, ventilating and warm air heating. Some of the outstanding buildings in which our work is represented are . . .

STATE OFFICE BUILDING
FIRST PRESBYTERIAN CHURCH
WHITTIER SCHOOL
FIRST BAPTIST CHURCH
GARFIELD SCHOOL
CAPITOL SCHOOL
PETER'S APARTMENTS
MILLER'S CAFETERIA
A. L. MOORE & SONS

*Consult us on all problems relating to Air-Conditioning Work*

Valley Plumbing
& Sheet Metal Works
J. B. STONEHAM
532 W. Adams St. Phone 3-6403

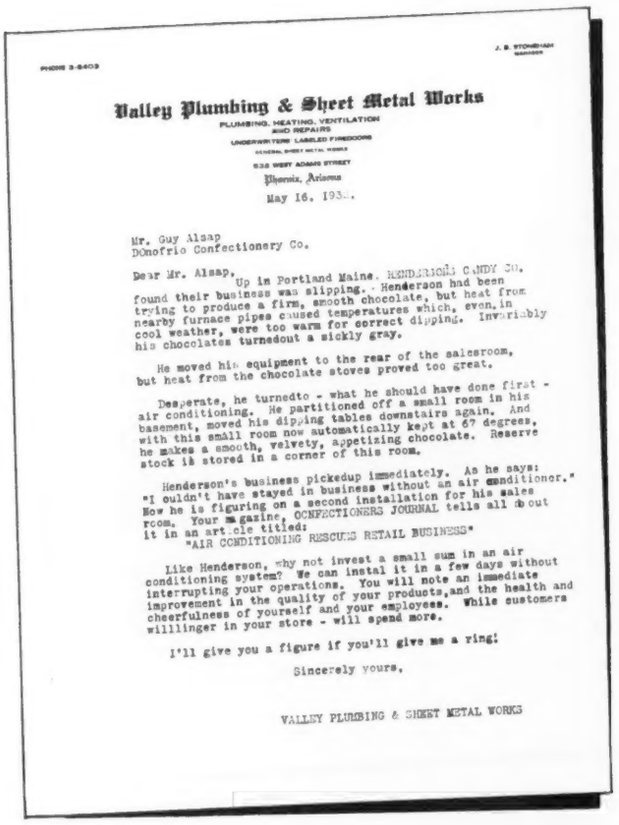

**The advertisement to the left appears in the Phoenix daily papers. Air conditioning, especially cooling, is one of the coming developments in Arizona and the Valley company intends to capitalize on this public interest. Note how completed work is stressed to indicate ability and responsibility**

### No "Donation" Ads

Stoneham discourages the use of testimonials in advertising, saying that the cigarette companies have killed testimonials deader than the dodo bird. "The customer's reaction to a printed testimonial now is: 'I wonder how much that heating and ventilating man paid Mr. Blank for that letter?'"

This sheet metal concern never enter floats in parades, pageants, fiestas, etc., nor do they issue novelties. No billboard, radio, sky-writing—but, alas, they confess they are sometimes sand-bagged into buying the unprofitable program-hotel-blotter-menu-bazaar-rummage-sale-and-strawberry-social type of copy.

Personal solicitation is naturally what they lean on heaviest. "At the moment we are fine-combing the town on replacement business. Every owner of a single bank washer is a redhot prospect for a



Valley Plumbing & Sheet Metal Works

PLUMBING, HEATING, VENTILATION AND REPAIRS

Phoenix, Arizona

May 16, 193..

Mr. Guy Alsap
DOnofrio Confectionery Co.

Dear Mr. Alsap,

Up in Portland Maine, HENDERSON'S CANDY CO. found their business was slipping. Henderson had been trying to produce a firm, smooth chocolate, but heat from nearby furnace pipes caused temperatures which, even in cool weather, were too warm for correct dipping. Invariably his chocolates turnedout a sickly gray.

He moved his equipment to the rear of the salesroom, but heat from the chocolate stoves proved too great.

Desperate, he turnedto - what he should have done first - air conditioning. He partitioned off a small room in his basement, moved his dipping tables downstairs again. And with this small room now automatically kept at 67 degrees, he makes a smooth, velvety, appetizing chocolate. Reserve stock is stored in a corner of this room.

Henderson's business pickedup immediately. As he says: "I couldn't have stayed in business without an air conditioner." Now he is figuring on a second installation for his sales room. Your magazine, CONFECTIONERS JOURNAL tells all about it in an article titled:

"AIR CONDITIONING RESCUES RETAIL BUSINESS"

Like Henderson, why not invest a small sum in an air conditioning system? We can instal it in a few days without interrupting your operations. You will note an immediate improvement in the quality of your products, and the health and cheerfulness of yourself and your employees. While customers willlinger in your store - will spend more.

I'll give you a figure if you'll give me a ring!

Sincerely yours,

VALLEY PLUMBING & SHEET METAL WORKS

**The letter to the left was sent to a confectioner. Note how the problem and solution of another confectioner was used to prove the need for Valley services**

**To the right is another newspaper advertisement stressing ventilation and air conditioning**

double bank. That is nice business, for the customer is already sold on air conditioning and no missionary work is necessary." (This was quoted last summer.)

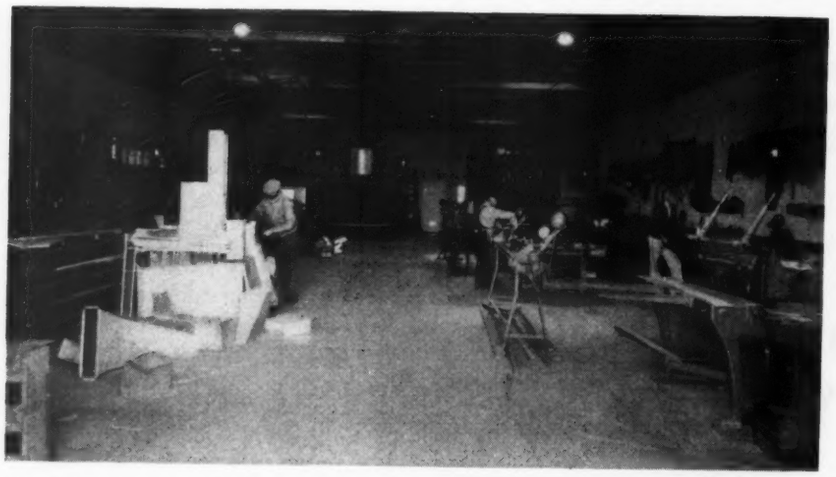
The main point to remember is that this successful firm has consistently appropriated from 3 to 5% of annual sales for advertising and spent 98% of this sum in *newspapers and magazines.*

Paid advertising, that is. Now consider some forms of *free* advertising which they have proved to be profitable:

It is well known that newspapers, with reduced advertising in their columns, are better able than ever before to provide the merchant with free space in which to insert newsy "news stories." Such stories, of course, must carry a general appeal. That is, they must deal with a subject in which almost every newspaper reader is interested. Now the air conditioning contractor is a man who is selling COMFORT, and because *everyone* is interested in comfort the newspaper editor secures 100% "reader interest" in any news item which tells of air conditioning improvements, achievements, new installations, or even mechanical details. Hence these stories are easily "sold" to newspaper editors.

Stoneham says he hasn't much time to compose these stories, but runs everything he can get from jobbers and manufacturers of air conditioning equipment. His name, and the address of his shop appear prominently in the story, and he reports a very fine response from this type of advertising.

CHECK THIS!
... we are
AIR CONDITIONERS
for the Gold Spot
Business buildings and homes of the Gold Spot have found that we can install a ventilation system that will manufacture cool, fresh, invigorating air during the hottest summer day! There's really no reason to suffer from the heat. Consult our ventilation engineers and see how you can pay for such a system in monthly payments.
SEE US FOR SHEET METAL SPECIALTIES
Let Us Put Your Furnace in Shape for Fall
Since furnaces are a specialty with us why not let us examine your heating plant NOW! Avoid delays and the inconvenience of a poorly functioning furnace when you need a fire. An inspection will cost little.
VALLEY PLUMBING and SHEET METAL WKS.
533 W. Adams
Phone 3-6603



**The Valley shop is not so large that it is an "overhead" burden, but operations have been worked out to save time and labor expense**

But to pass to other forms of free advertising. In this category come the contractor's motor trucks. Next time you go out the door look about and you will probably be surprised to observe that the most successful business firms are now operating trucks which are not only late-model, but are kept freshly painted

—some leading department stores, and other clever merchandisers, repaint trucks twice a year, or oftener. This significant change in business has come about during the past two years. It is one of the lessons taught by the depression. Three hundred people may see your neat and modern shop this year, but for every 300 who cross your threshold 300,000 will see your trucks. Obviously, these trucks should be neat and modern if you want them to impress.

### Don't "Join" for Jobs

Stoneham has six such perambulating billboards.

Speaking of the wisdom of joining clubs, lodges, civic and religious bodies "for business purposes," he says it is the bunk. "You get out only what you put in. And to put in anything you have to be active—not just a member. That takes time. Time which might better be employed in study—perfecting oneself in the ramifications and the swift changes which are taking place in this business of air conditioning. A man should join a lodge, or club, or church—yes. But never for business purposes. I am a 32nd degree Mason, and the friendships formed as a result are among the biggest things in my life, yet it never occurred to me to think of the business I might get thereby. Though, like every other business man, I get a lot of business from friends."

Stoneham is not a disciple of mass production. He likes to personally superintend every job, explaining that his organization functions best, he has discovered, with only thirteen to fourteen men. "That is the maximum crew *one* man can superintend economically. Add more to the payroll and waste is apt to occur."

He followed this policy all during the "roaring twenties," turning down work right and left. As a result he is in a good financial position today—never an unpaid bill in the shop after the tenth of the month.

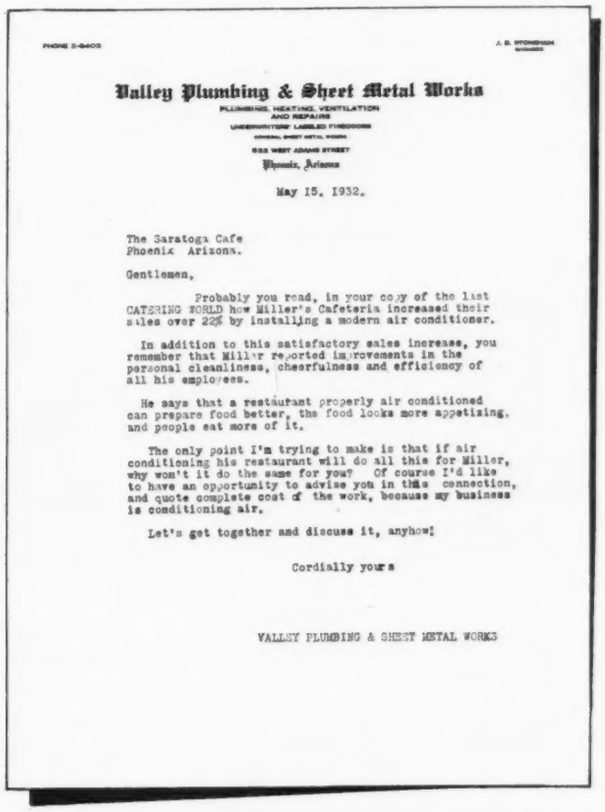
Stoneham has this one complaint: "The constant changes and improvements in air conditioning make one dizzy. Worse—there is danger of the customer sometimes knowing more about the subject of air conditioning than the salesman himself, due to the wide interest the public has manifested in the subject in recent months, and the wide dissemination of such information through the 'home-and-garden' magazines, etc. Hence there is a necessity for constant vigilance, for if a certain type of customer is allowed to dominate an interview, all confidence—and the sale—is lost. Today sheet metal contractors must 'go back to school' and study."

In 1928 Stoneham invested $1,750 in the Valley Plumbing & Sheet Metal Works. On January 1, 1932, that investment was certified as worth $31,000.

He has made this very satisfactory increase, during the "depressed" years, by cleverly advertising to the buying public.

Now---
A Home Cooling Plant That Is Inexpensive
Stores
Cafes
Offices
all are in need of our
Cooling and Ventilating Systems
For the comfort of Phoenix home owners we are able to figure on a smaller home cooling plant that you can install in your home.
Let Us Figure With You
Business is better in the stores that are air-cooled. Just check this statement with those stores that are enjoying this added comfort.
Valley Plumbing & Sheet Metal Works
J. B. STONEHAM, Proprietor
532 West Adams St.
Phone 3-6403

**To the left another newspaper advertisement appearing during the hot season and soliciting work on the strength of conditioning at a price the average home owner can pay**



Valley Plumbing & Sheet Metal Works

PLUMBING, HEATING, VENTILATION AND REPAIRS

532 WEST ADAMS STREET

Phoenix, Arizona

May 15, 1932.

The Saratoga Cafe
Phoenix Arizona.

Gentlemen,

Probably you read, in your copy of the last CATERING WORLD how Miller's Cafeteria increased their sales over 22% by installing a modern air conditioner.

In addition to this satisfactory sales increase, you remember that Miller reported improvements in the personal cleanliness, cheerfulness and efficiency of all his employees.

He says that a restaurant properly air conditioned can prepare food better, the food looks more appetizing, and people eat more of it.

The only point I'm trying to make is that if air conditioning his restaurant will do all this for Miller, why won't it do the same for you? Of course I'd like to have an opportunity to advise you in this connection, and quote complete cost of the work, because my business is conditioning air.

Let's get together and discuss it, anyhow!

Cordially yours

VALLEY PLUMBING & SHEET METAL WORKS

**The letter to the right illustrates one of the points which has made this campaign successful — the letter refers to an article which the Saratoga Cafe owner probably read only a few days before in his business paper**

# BASIC PRINCIPLES OF HEATING

By G. A. Voorhees

## How to Calculate Temperature Difference

SINCE the hourly heat transmission loss through one square foot of exposed surface is equal to the heat loss factor for the given type of building construction, multiplied by the inside-outside temperature difference, it is essential that we use the correct temperature difference in making the calculations.

We base our calculations on a certain assumed outside temperature—usually zero, ten degrees below zero, or some other arbitrarily set temperature that meets the requirements of the locality. Hence the correct determination of the inside temperature for a given building is the governing factor in establishing the proper inside-outside temperature difference.

In residence heating we usually take the breathing line temperature five feet above the floor, as the room air temperature in fixing the inside-outside temperature difference for the calculation of transmission losses. We know that the room air temperature increases more or less gradually from floor to ceiling and we usually assume that this increase is uniform.

For illustration we might say that in a room with a 10-foot ceiling, we would have:

75-degree air temperature at ceiling

70-degree air temperature at breathing line

65-degree air temperature at floor.

This gives us a uniform temperature increase from floor to ceiling amounting to one degree for each foot of elevation as shown diagrammatically in Figure 16.

With these room air temperatures, if the outdoor temperature for which the job is to be figured, is ten degrees below zero, we have:

85-degree inside-outside temperatures difference at ceiling

80-degree inside-outside temperature difference at the breathing line.

75-degree inside-outside temperature difference at floor.

### "Average" Temperature

Hence by using the breathing line temperature as representing the room air temperature, the 80-degree inside-outside temperature that this gives us, is the *average* inside-outside temperature difference for the room.

We might have 60 degrees at the floor, 70 at the breathing line and 80 at the ceiling, and while it would doubtless be an uncomfortable room on account of the low temperatures prevailing in the occupied zone below the breathing line (often spoken of as "cold seventy"), the *average* room air temperature would still be seventy degrees and that would continue to be the correct basis for determining our inside-outside temperature difference for figuring heat transmission losses through the exposed walls.

But suppose we have a church auditorium or a studio living room in a residence with a 15 or 20 feet ceiling; what will be the *average* temperature of room air in contact with the exposed walls? And what will be the temperature of air in contact with the ceiling? We must have some reasonably correct basis for estimating these temperatures before we can hope to figure our transmission losses without bringing in serious and trouble breeding errors.

Experience offers a number of empirical rules that have been found adequate in many cases. One for estimating the mean temperature of room air in contact with an exposed wall, which is known as Rietschel's formula, is as follows:

$t_m = t \times [1 + 0.017 \times (h - 10)]$

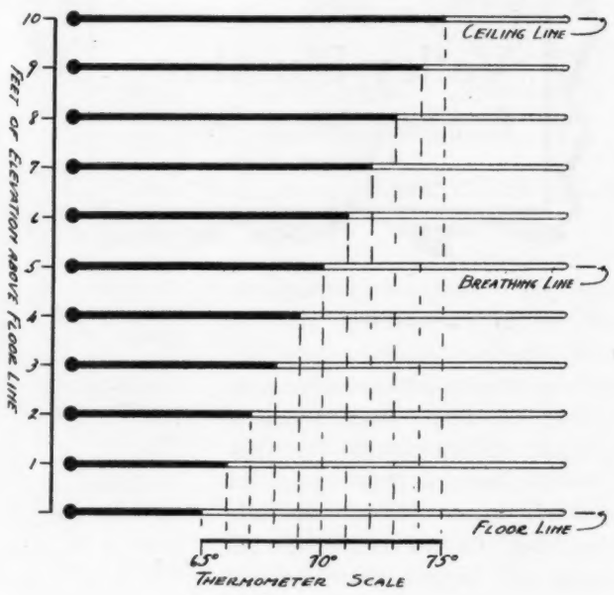
in which

$t_m$ = mean temperature of room air in contact with an exposed wall

$t$ = room air temperature at breathing line

$h$ = height of exposed wall, in feet.

**The temperature rise for each foot above the floor line is shown graphically by this thermometer chart. The rise is one degree for each foot of elevation above the floor. The rule must be changed for high ceilings —that is more than 12-foot**



This formula says in mathematical symbols that the mean air temperature in contact with the exposed wall increases by 1.7% of the breathing line temperature, for each foot of total height of the wall beyond ten feet. It is usually assumed that the mean temperature of air in contact with an exposed wall will not exceed the breathing line temperature by more than 15% which means that for ceilings 20 feet high or higher, the limiting value of $t_m$ in this formula is 1.15 x t.

### High Ceiling Formula

The principal objection to Rietschel's formula as it is usually employed in this country, is that it applies only to exposed walls and a different rule must be used to determine the very important item of air temperature in contact with the under side of cold ceilings and roofs when their height is more than 10 or 12 feet above the floor. In spite of this objection the rule is given here that the reader may have it available for reference as it is widely used and frequently quoted.

The following rule is offered as being more practical because it applies either to side walls or to ceilings and roofs:

**The temperature of room air at any elevation more than five feet and not more than 20 feet above the floor, will be 2% more than the breathing line temperature for each foot of elevation above the breathing line.**

Expressed as a formula, this becomes:

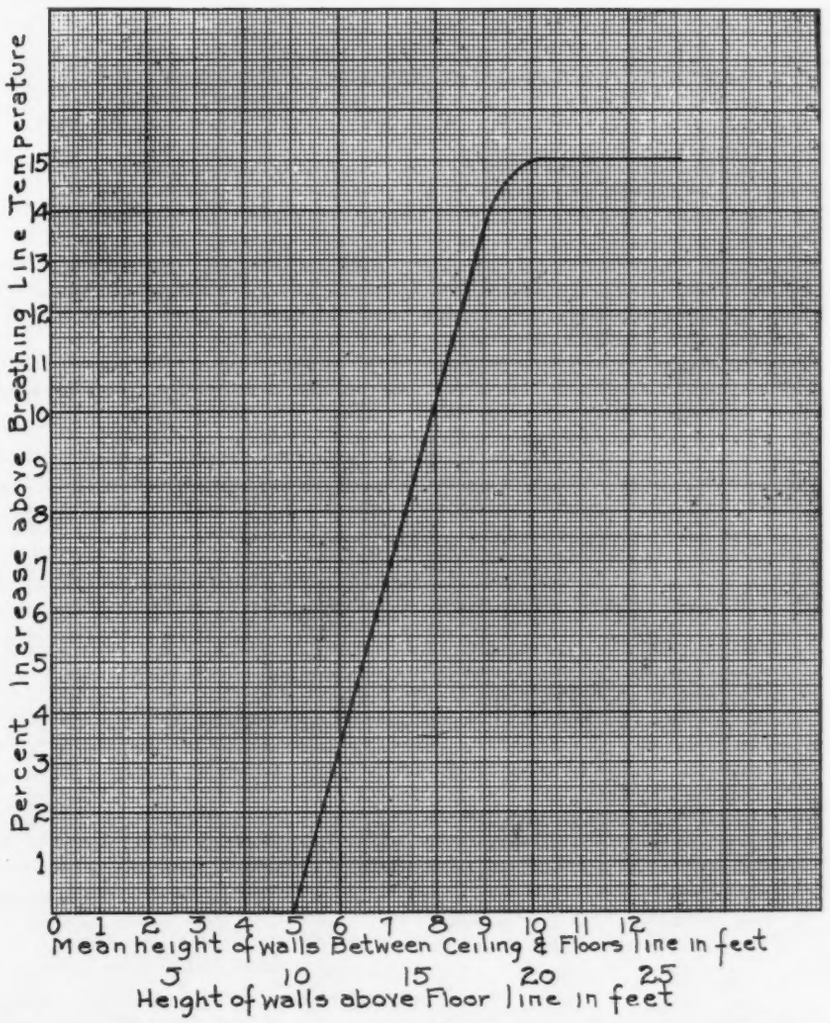
$T = t \times [1 + 0.02 \times (h - 5)]$ in which

T = temperature of air at height of h feet above floor line

t = temperature at breathing line

h = height in feet above floor at which temperature is to be determined.

(Note that in the case of an exposed wall, h is not the total height of the wall, but is the mean height as will be shown in examples which follow.




**This plotted line indicates the rise in temperature for each foot of ceiling height. This particular chart is used by several engineers and was originally established in indirect-ventilation work. Note that the temperature rise is in percentage and not in degrees. Two scales are shown at the bottom**

It must be understood that this is an empirical rule, one that merely expresses approximations found by observation to hold true within practical or ordinary limits and is by no means a precise and complete expression of a mathematically correct physical law. Bulletin 189 of the University of Illinois shows, for instance, that with a fixed (70-degree) air temperature at the breathing line, the air temperatures at the ceilings in the research residence vary considerably with the outside temperature. Hence, if this formula were complete, it would have to contain a factor to compensate for variations in outdoor temperature. But for practical use, we can neglect that factor as we usually design plants on the basis of an outside temperature in the neighborhood of zero and for the occasional extreme case we can make an arbitrary allowance.

Another variable factor is register air temperature. With a fan system we find that if we recirculate or change the air in the room eight times instead of three or four times per hour, our register air temperature is markedly reduced by the increase in volume of air delivered—and lower register temperatures mean lower air temperatures in the upper levels of the room. Therefore a complete and mathematically accurate formula would contain also a factor to make correction for variations in register temperatures — or for different numbers of hourly air changes since air changes and register temperatures are interdependent.

At present a sufficient amount of data is not available covering a

number of variables that affect air temperature at different elevations within a room and the best we can do is to use an approximate rule or formula like the above.

The art of heating has developed rapidly into a science and history shows that all science advances by a series of approximations, each more accurate than the last, but each open to countless further refinements. Warm air heating in its advance, has made use of a succession of approximate methods for determining various facts and although these methods have been gradually modified and refined, we must still content ourselves with many rules that cannot be expected to give precisely accurate results. Instead, we must take the rules now available and apply them with discretion and judgment to attain results that are correct within practical limits.

Probably most of the readers of this article who are actively engaged in and are seriously studying warm air heating, have developed rules based on their own observation—rules that are very helpful in their daily work when applied with judgment and in the light of past experience. The writer wishes to submit a similar rule, or rather a modification of the above "2%-per-foot" rule, which he has found desirable for use in estimating heat losses of auditoriums, factories and other buildings having high ceilings and in which mechanical forced air systems are to be installed.

### Fan System Rule

The "2%-per-foot" rule works out very well for direct radiation and for warm air systems that provide three or four air changes per hour, but for fan systems that change or recirculate the room air six or more times per hour with a consequent reduction of register temperature, the following modifications of the rule are suggested:

(a) For six air changes per hour substitute 1⅔% for 2%;

(b) For eight or more air changes substitute 1⅓% for 2%.

Applying this rule to exposed walls and assuming that the temperature increases uniformly from floor to a ceiling, it becomes evident that the temperature of room air in contact with wall midway between floor and ceiling, is the temperature we are seeking.

**Example:** What will be the mean temperature of air in contact with a wall 18 feet high when the breathing line temperature is 55 degrees?

Working from the rule: The mean height of the wall is $18 \div 2 = 9$ feet and this is $9 - 5 = 4$ feet above the breathing line. Allowing a temperature increase of 2% per foot for each foot above the breathing line, the temperature at the 9-foot level would be $4 \times 2\% = 8\%$ above the breathing line temperature of 55 degrees. Eight per cent of 55 degrees or $0.08 \times 55 = 4.4$ degrees and the temperature we are seeking is therefore $55 + 4.4 = 59.4$ degrees.

Instead of first figuring 8% of 55 degrees and adding it to 55 degrees, we could say that the desired temperature would be 55 degrees $\times$ $(100\% + 8\%) = 55 \times 108\%$ or $55 \times 1.08 = 59.4$ degrees.

**Example:** What will be the mean temperature of air in contact with a wall 17 feet high with a breathing line temperature of 70 degrees?

Working this by the formula instead of the rule: The mean height of the wall above the floor is $17 \div 2 = 8.5$ feet. Substituting in the formula the values:

$t = 70$ degrees
$h = 8.5$ feet

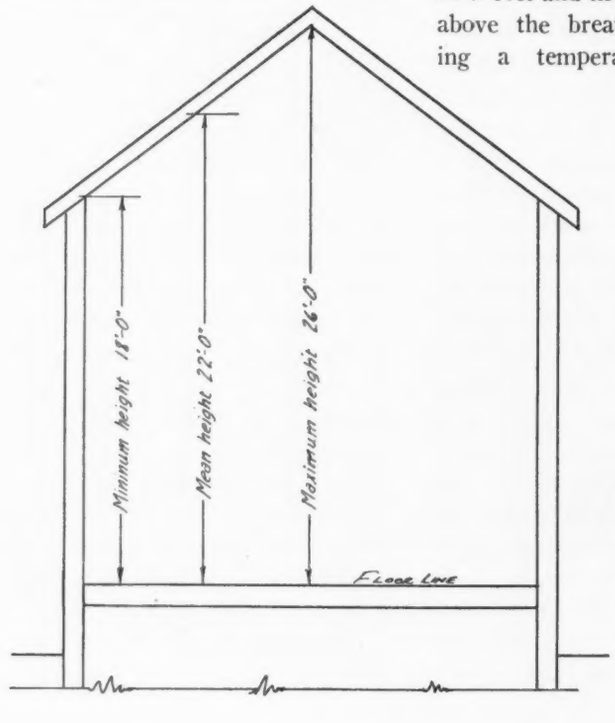
gives us

$$T = 70 \times [1+0.02\times(8.5-5)]$$
$$= 70 \times [1+0.02\times 3.5]$$
$$= 70 \times [1+0.07]$$
$$= 70 \times 1.07$$
$$= 74.9$$ degrees, mean temperature of room air in contact with the exposed wall.

**Example applying to a flat ceiling:** With a breathing line temperature of 70 degrees and with a plant providing approximately six air changes or recirculations per hour, what will be the air temperature at a ceiling 14 feet above the floor?

Solving by the rule: The elevation at which the air temperature is to be determined is $14 - 5 = 9$ feet above the breathing line. Allowing a temperature increase of 1⅔% (corresponding to six air changes per hour) for each additional foot of elevation above the breathing level, the ceiling temperature would exceed the breathing line temperature by nine times 1⅔% of 70 degrees. Thus: $9 \times 0.0167 \times 70 = 10.5$ degrees and $70 + 10.5 = 80.5$ degrees temperature at the ceiling.

(*Continued on page* 59)




**The drawing shows what is meant by "mean" ceiling height when the ceiling is a roof or is pitched. The height to be used in the formula is found by adding the peak height to the eave height and dividing the sum by 2**

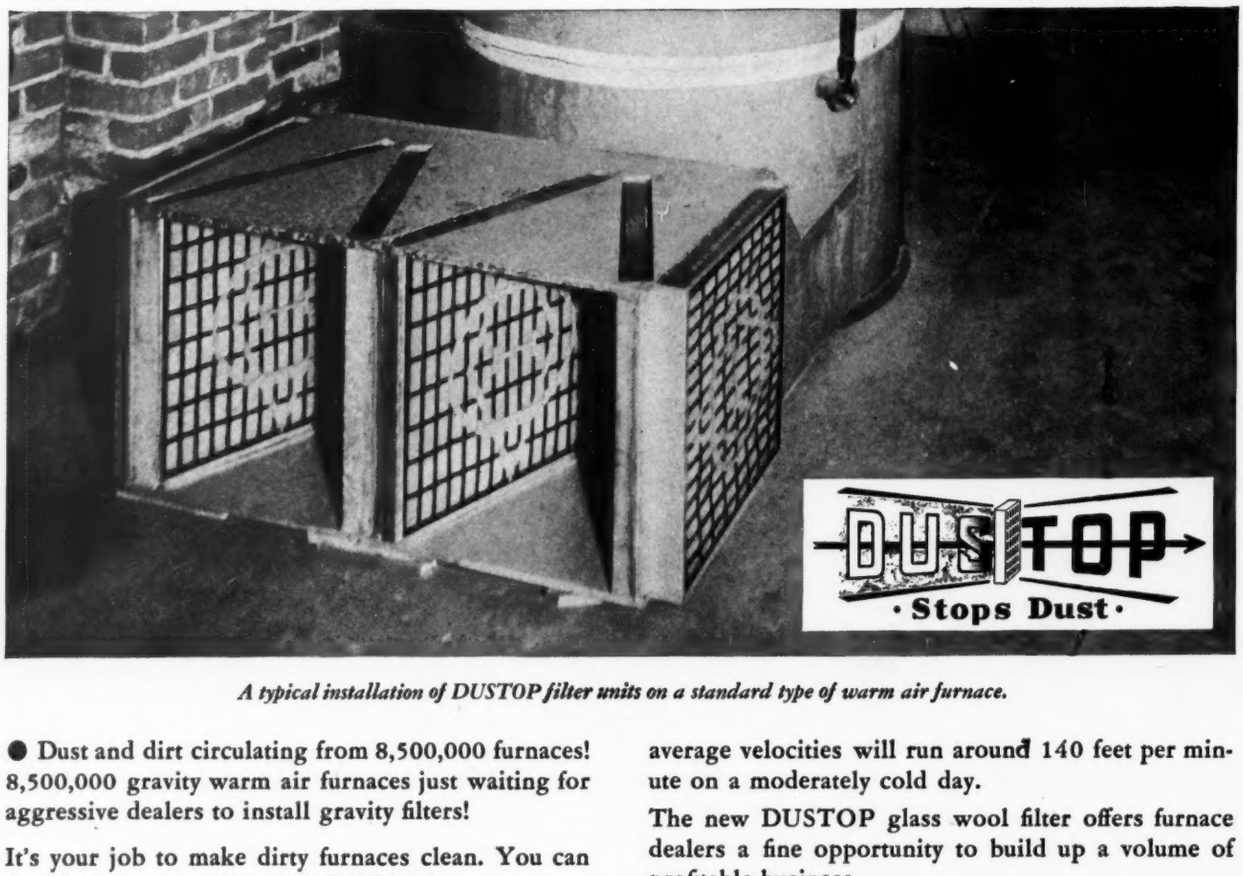
AMERICAN ARTISAN

# Automatic Heat *and* Air Conditioning Dealer Section

When contractors in the warm air field first interested themselves in forced air heating, they took a definite step in the direction of air conditioning which, without doubt, holds large promise for the future.

. . . . . At the same time, air conditioning without automatically controlled heating arrangements is hardly to be thought of. Hence this special section, and in this, our second issue of the section, we continue to bring up-to-the-minute information on the allied subjects of air conditioning and automatic heating.

# 8,500,000 PROSPECTS
## *and profit in every job*




*A typical installation of DUSTOP filter units on a standard type of warm air furnace.*

● Dust and dirt circulating from 8,500,000 furnaces! 8,500,000 gravity warm air furnaces just waiting for aggressive dealers to install gravity filters!

It's your job to make dirty furnaces clean. You can do this job at a profit—with DUSTOP.

DUSTOP retails to the householder at $1.50. This low figure enables you to use as many of them as are necessary to do an effective job.

Dust is one of the gravest concerns of the modern housewife. There's a smooth selling approach for you. Tell housewives that you can stop furnaces from spreading dust and dirt and you'll get into as many basements as the meter man.

DUSTOP filters will live a whole heating season and more. DUSTOP is the only filter that will do a real job of cleaning on low velocities —as low as 25 feet per minute. And average velocities will run around 140 feet per minute on a moderately cold day.

The new DUSTOP glass wool filter offers furnace dealers a fine opportunity to build up a volume of profitable business.

For more detailed information mail the coupon today. You will receive a booklet giving complete information on DUSTOP installation both for gravity furnaces and for the revamping of gravity jobs for mechanical circulation of filtered and heated air. Owens-Illinois Glass Company, Toledo, Ohio.

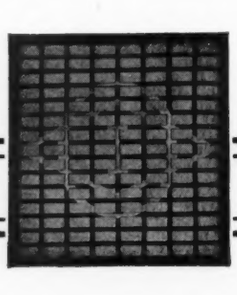
Owens-Illinois Glass Company (Industrial Materials Division)
Toledo, Ohio
Please send me your booklet "Jobs To Do at a Profit."

*Name*_____

*Address*_____

_____

*Furnace filters for gravity and mechanical warm air furnaces*



*distributed through jobbers and manufacturers everywhere.*

OWENS-ILLINOIS AIR FILTERS

**Humidification will unquestionably be one of the most discussed subjects of the coming heating season. Old customers and new prospects will insist on knowing what you can give them; what equipment must be used; how much humidification will cost. Strangely enough, humidification is one of the subjects on which we talk a lot and actually know least about. This article is the first of a series which will give you complete information on humidity. Mr. Tomlinson will work with the Research Residence staff to develop the facts. Some entirely new ideas will also be presented.**

# Principles of Humidification

By Malcolm Tomlinson

THE first step, in any humidification scheme, for increasing the relative humidity of the inside air is to change water into water vapor.

Of the four methods previously described for accomplishing this purpose only one, the open pan, has found general favor in the warm air heating industry, although the spray method, in air washers, is coming into favor. This type of pan may be applied at any one of the four different locations in warm air furnaces and is designed to absorb heat from the furnace as an aid to evaporation. The various locations for pans are shown in Figs. 1 and 2. The terms used to designate these pans are "dome," "front" or "regular," "crescent" and "base."

Comparative information on the evaporation rate of these four types of pans, when used with warm air furnaces, has been obtained through tests at the Engineering Experiment Station of the University of Illinois, described in Bulletin No. 230. These experiments were supplemented by evaporation tests on the type of water pan generally used with the shields applied to steam and hot water radiators.

One set of evaporation tests was made in the Mechanical Engineering Laboratory of the Illinois Engineering Experiment Station while the second set was obtained with the same furnace installed in a three story frame house used for warm air research by the experiment station. The normal conditions which prevail in warm air heating were thus obtained in the latter location.

A standard type of cast iron circular-radiator furnace, with a 27-inch firepot, was used. With the exceptions noted, all tests were made with anthracite coal as fuel. The research residence has a total heated volume of 16,120 cubic feet and the temperatures within this building were maintained at 70 degrees by means of a thermostat. An elevation of the furnace testing plant within the laboratory is shown in Fig. 3.

The amount of water which must be evaporated in cold weather is dependent on the inside and outside temperatures and relative humidities. Suppose it is assumed that a 40 per cent relative humidity must be maintained indoors. What must the evaporation be if the outside temperature is 0 degrees with a relative humidity of 90 per cent and with an inside temperature of 70?

Saturated air at 0 degrees contains 0.00078 pounds of water vapor for every pound of bone dry air. So, at 90 per cent, there is $0.9 \times 0.00078$ or 0.0007 pounds of water vapor present. Since saturated air at 70 degrees contains 0.01578 pounds of water vapor for every pound of dry air and as the air entering the house holds only 0.0007 pounds of water vapor, it is evident that, no matter what the relative humidity

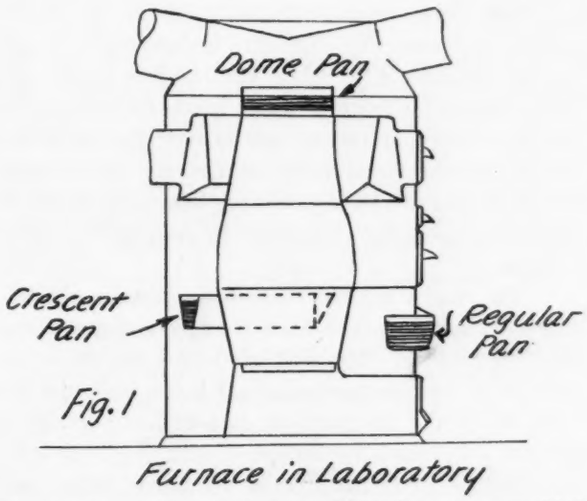



**Fig. 1 shows three typical humidification pans provided with warm air furnaces. The aim in every case is to place the pan in a hot section where radiant or conductive heat will raise the water temperature**

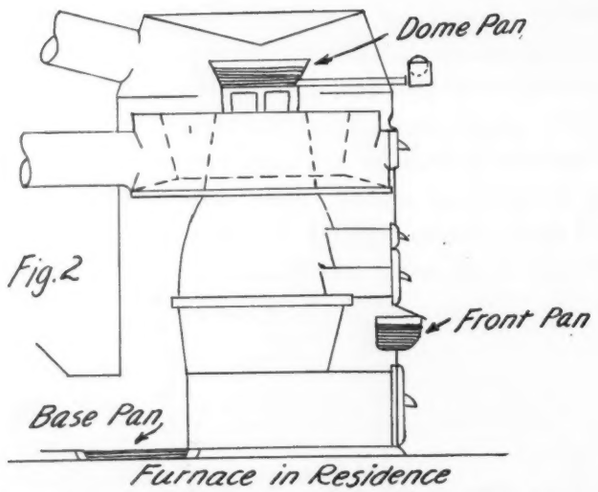


Fig. 2

**Fig. 2 shows an additional form of pan—the base pan—and some variations of two pans shown in Fig. 1. All types have been tested at the Research Residence and their ability to give off moisture charted**

might be at the start, it would soon decrease to

$$100 \times \frac{0.0007}{0.01578} = 4.4 \text{ per cent.}$$

The evaporation for humidification is thus represented by the difference between 40 and 4.4 per cent relative humidity. This amount is equal to $(0.40 \times 0.01578) - 0.0007$ or 0.0056 pounds of water for every pound of dry air.

Now, if the air within the residence is changed by infiltration once every hour, the total volume of air to be humidified, per 24 hours, is $16{,}120 \times 24$ or 386,880 cubic feet. Through reference to a psychrometric chart or table it will be found that 13.49 cubic feet is the volume of an air-water vapor mixture humidified to 40 per cent relative humidity and heated to 70 degrees.

Therefore: $\frac{386{,}880}{13.49} = 28{,}680$ pounds of dry air must be humidified.

This will require $28{,}680 \times 0.0056$ or 160.61 pounds of water. This quantity is converted into gallons by dividing it by 8.33. The result is 19.28. We now have the quantity of water which must be vaporized in a warm air furnace pan to meet the inside and outside weather conditions specified for the research residence described. We will see how close warm air furnace evaporating pans come to meeting this specification.

The results secured through the tests in the mechanical laboratory have been averaged and graphed in Figs. 4a and 4b. The first of these gives the actual amount of water evaporated in 24 hours while the second shows the comparative evaporation per square inch of water surface exposed.

In these tests the area of the water surface was 146 square inches for the dome pan, 199 square inches for the crescent pan and 94 square inches for the regular pan. The evaporation per square inch of surface exposed was identical for the crescent and regular pans at 150 degrees equivalent register temperature. Furthermore, the rate of evaporation for the crescent pan, on an area basis, increased faster as the temperature rose than did the rate for the other two pans.

In actual evaporation the dome pan handled from 9.7 to 16.7 gallons of water per 24 hours between 150 and 180 degrees equivalent register temperature, the crescent handled from 6.6 to 16.0 gallons and the regular pan from 3.1 to 5.1 gallons.

None of these results approach the calculated requirements *for the research residence* at register temperatures recommended in practice.

When bituminous coal was fired, the evaporation rate for the crescent pan remained a constant at 2.3 gallons per 24 hours. This was with the pan midway between the firepot and the casing. When the position of the pan was shifted so that the outer edge touched the casing the rate remained constant at 1.2 gallons per 24 hours. All of these results are too low for humidification at 40 per cent relative humidity. Nevertheless, it is evident that the dome and crescent pans would meet evaporation requirements for a 30 per cent relative humidity at an equivalent register temperature of 170 degrees.

In Fig. 5 is given the results of tests in the research residence. Here the outside and inside relative humidities, as well as the evaporation, have been plotted against the temperature difference between the inside and outside air. The inside air was held at a constant temperature of 70 degrees by means of a thermostat.

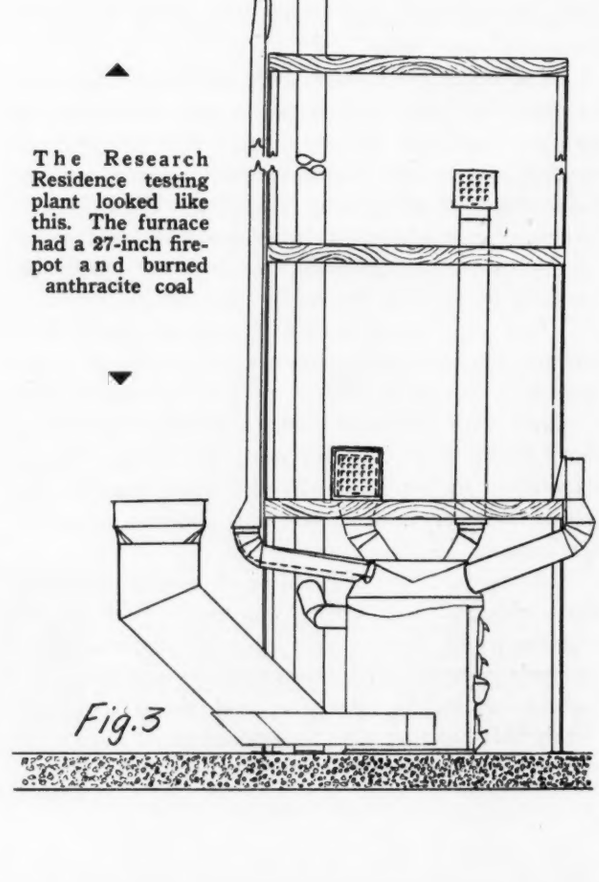


Fig. 3

**The Research Residence testing plant looked like this. The furnace had a 27-inch firepot and burned anthracite coal**

In all cases the resultant equivalent register temperatures were lower than those had in the laboratory tests. For example, the equivalent register temperature for a temperature difference of 70 degrees (0 degree outside temperature) was 140 degrees. Therefore the rates of evaporation obtained were consistently lower in these tests than in the laboratory tests. The area of the water surface for the pans was 154 square inches for the dome, 92 square inches for the front and 936 square inches for the base.

TABLE I

**WATER VAPOR ANALYSIS FOR EVAPORATION TESTS AT RESEARCH RESIDENCE**

| **Outside Temp.—Deg. F..** | **50** | **30** | **10** | **—10** |
|---|---|---|---|---|
| Outside Rel. Hum.—%.. | 62.5 | 79 | 92 | 100 |
| Moisture of Outside Air— | | | | |
| Lbs. per Lb. D.y Air.. | 0.00382 | 0.00272 | 0.00121 | 0.00049 |
| Inside Temp.—Deg. F.. | 70 | 70 | 70 | 70 |
| Inside Rel. Hum.—%.... | 39.5 | 27 | 21 | 17 |
| Moisture of Inside Air— | | | | |
| Lbs. per Lb. Dry Air.. | 0.00523 | 0.00426 | 0.00331 | 0.00268 |
| Moisture From Other Sources Than Air— | | | | |
| Lbs. per Lb. Dry Air.. | 0.00141 | 0.00154 | 0.00210 | 0.00219 |
| Moisture From Pans— | | | | |
| Gals. per 24 Hours.... | 2.3 | 4.1 | 5.8 | 7.9 |
| Lbs. per 24 Hours..... | 19.159 | 34.153 | 48.314 | 65.807 |
| Lbs. per Lb. Dry Air.. | 0.00067 | 0.00119 | 0.00167 | 0.00229 |
| Moisture From Sources Other Than Air and Pans | | | | |
| Lbs. per Lb. Dry Air.. | 0.00074 | 0.00035 | 0.00043 | none |
| Gals. per 24 Hours.... | 2.5 | 1.21 | 1.48 | none |

**In Table 1, above, are shown the quantities of water which must be evaporated every 24 hours at temperatures (outside) of 50, 30, 10 and —10 degrees. The table includes other sources of moisture and results obtained**

With such marked difference it is apparent that the base pan, per square inch of area, is the least efficient and that the dome pan is the most efficient evaporator. The evaporation results for the research residence range from 2.0 to 7.5 gallons of water per 24 hours for the base pan, from 1.0 to 4.9 gallons for the dome pan and from 0.5 to 1.6 gallons for the front pan.

A very peculiar fact brought out by these tests was that, while each type of pan tested gave different evaporation rates, the inside relative humidity was, apparently, not affected by the water vapor thus provided. In fact the relative humidity varied solely with the temperature difference and the decline in the outside temperatures. To understand what this means analysis is necessary to determine the effect of evaporation and of the outside weather conditions.

In Table 1 will be found the quantities of water vapor needed to supply the relative humidity noted inside the research residence. For the purpose of analysis the outside temperatures used were 50, 30, 10 and —10 degrees F. The actual water vapor supplied by the outside air, the water vapor from evaporation in the base pan and the water vapor which remains unaccounted for by analysis have been calculated.

Of the four conditions selected for analysis only one furnishes sufficient water vapor, *from the outside air and from water pan evaporation,* to account for the total water vapor which must be supplied. *In the other three cases the moisture unaccounted for ranges from 1.2 to 2.5 gallons per 24 hours.* These amounts represent almost 15 per cent of the total moisture required. This is too high a percentage to be neglected.

Most building materials are hygroscopic by nature. Such materials gain or lose moisture through the rise or fall of the relative humidity. You might consider outside walls, for example, as storage tanks which absorb moisture when the outside relative humidity is high and which give up moisture when the outside relative humidity is low. Furthermore it is now known that, when there is a considerable difference between the inside and outside relative humidities, moisture actually "flows" through walls and thus humidifies dry atmospheres. For a building with the heating capacity of the research residence it is altogether possible for this moisture flow through walls

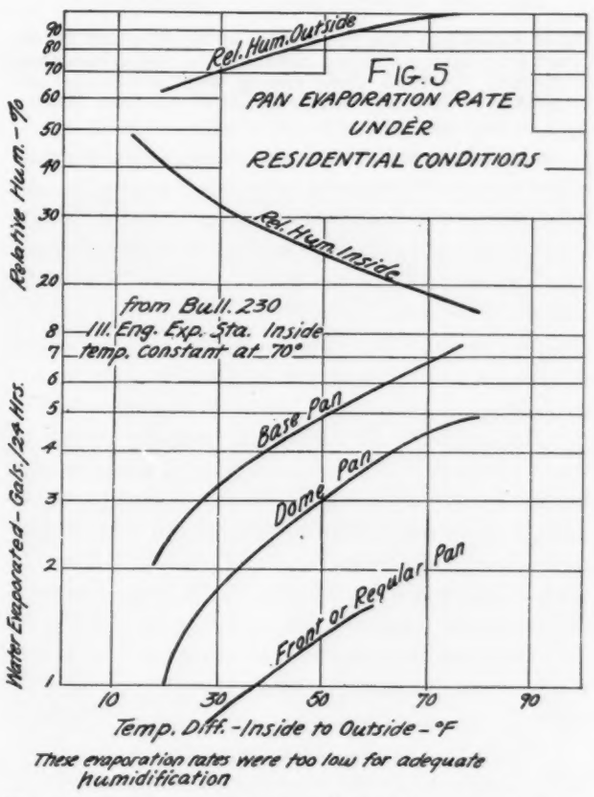


FIG. 5
PAN EVAPORATION RATE UNDER RESIDENTIAL CONDITIONS
Rel. Hum. Outside
Rel. Hum. Inside
from Bull. 230 Ill. Eng. Exp. Sta. Inside temp. constant at 70°
Base Pan
Dome Pan
Front or Regular Pan
Relative Hum. - %
Water Evaporated - Gals./24 Hrs.
Temp. Diff. - Inside to Outside - °F
These evaporation rates were too low for adequate humidification

**Fig. 5 shows the results of tests. Outside and inside relative humidities have been plotted against the inside-outside temperature difference. Inside temperature was held at 70 degrees during the test**

and roofing to amount to several gallons of water per hour when the relative humidity difference is very high.

In view of these facts it is probable that: (1) Moisture stored in the building materials, under higher relative humidity conditions, was in the process of be-

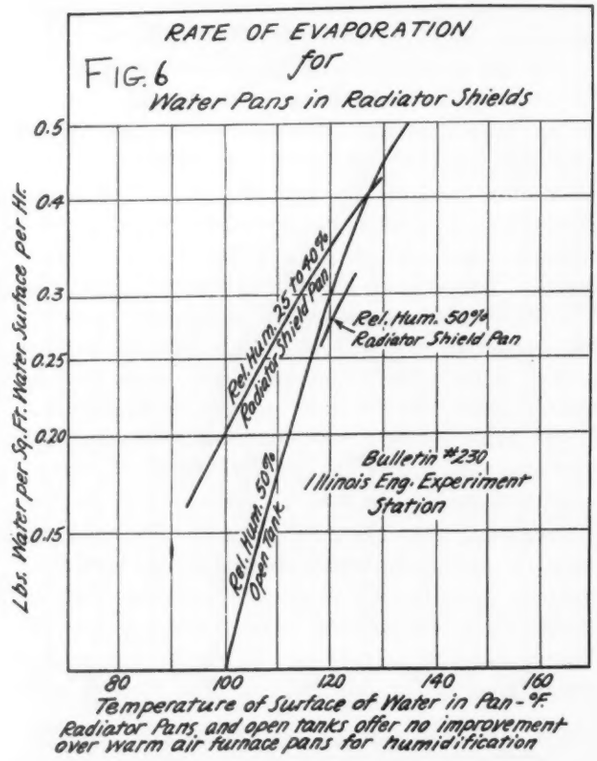



**Fig. 6 shows just how much relative humidity can be obtained from open room and radiator pans under laboratory conditions. Compare these results with percentages obtained in a warm air furnace shown in the chart below**

ing released when the tests were made. (2) Moisture might have been produced from other sources besides the building materials. Therefore it is not surprising to find unaccounted for moisture, in humidification calculations, or for such moisture to run as high as 2.5 gallons in 24 hours. Checking moisture requirements with the moisture supplied by the air plus the actual amount of water evaporated is not, therefore, always possible.

On the basis of the outside weather conditions which obtained, for the tests in Fig. 5, inside relative humidities of 40, 30 and 17 per cent could only be had at outside temperatures of 50, 35 and —10 degrees respectively. Therefore the water evaporated from the pans in the research residence was inadequate to meet the necessary humidification requirements.

There are three methods by which the pan evaporation, in the research residence, could have been increased.

As air velocity influences evaporation it would have been possible to have obtained satisfactory results by decreasing the size of the furnace. In this way the gravity air motion would have been increased. This method is not altogether advisable since the efficiency of the heating plant would have been reduced below practical limits. Also higher register temperatures would be required.

A second and more satisfactory method of obtaining higher air velocities is available. Mechanical air motion, furnished by a small motor driven fan, can be used to not only speed up evaporation of water from the furnace pans but also to increase the output (capacity not efficiency) of the heating plant. This method lends itself best to furnace sizes comparable to forced air motion which, for the research residence, would call for a smaller size of furnace than 27 inches. A third method is worthy of consideration as furnishing the means of accomplishing the purpose desired with gravity air motion as well as a fan system. This calls for weather stripping for doors and windows in order to cut down the air infiltration from one to a third of an air change per hour. Thus the evaporation requirement would be reduced to within the limits of evaporative capacities of warm air furnace pans. This method will be discussed in an article to follow.

In Fig. 6 the rate of evaporation from pans in radiator shields and from an open tank are considered. The data used were obtained by the Illinois Engineering Experiment Station in laboratory tests. Two types of radiators were used. One was a 20-section, 38-inch,

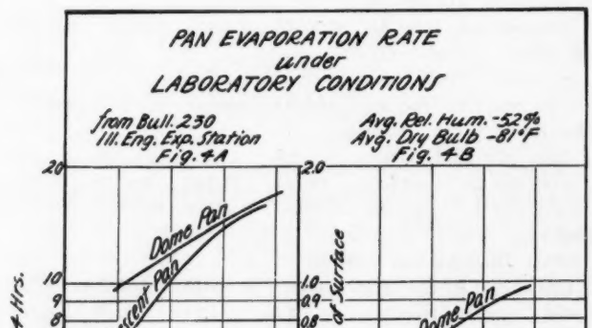



**Fig. 4A shows the number of gallons of water evaporated in 24 hours in the Research Residence plant for three types of pans. Fig. 4B shows the rate of evaporation for these three pans according to the square inches of water surface exposed to the air**

3-column cast iron type with rated capacity of 100 square feet. The other was a 6-section, 26-inch, 3-column cast iron radiator with a rated area of 22.5 square feet. Two shields were used on the 26-inch radiator. One had a clearance of ½ inch between the pan and shield. The other had a clearance of 1 inch. The top

(*Continued on Page 47*)

# INSULATION—An Important Factor in Air Conditioning

By A. P. Kratz

## Part I

**In this paper, delivered at the Midwest Bituminous Fuels Conference, Professor Kratz brought out some unusually pertinent facts about insulation. For example, most insulations in common use have about the same inherent value but overall efficiency, or the application of the insulator in a building, is of more importance than the conductivity of the material considered alone. With interest in more expensive fuels and summer cooling on the increase, every heating contractor must be able to discuss and understand insulation**

THE PROBLEM of economical heating may be divided into two parts, consisting of first, the effective production and utilization of heat; and second, the effective conservation of the heat produced. While these two parts of the problem are of equal importance, most of the emphasis has been placed on considerations of the factors affecting the choice of equipment for efficient production and utilization of heat, and until recent years the use of insulation as a means of effective conservation of heat through the reduction of the heat loss from the building as a whole, has not received the consideration that it merits.

Today, however. the increasing popularity of more expensive fuels and the necessity for effective methods of conservation of heat where such fuels must compete with coal, has finally directed the attention to various methods of conservation, with the result that numerous forms of heat insulation materials have appeared on the market. The use of these materials involves additional investment outside of the heating plant itself, and the fact that such an additional investment in the case of a coal fired plant also secures corresponding benefits in the shape of reductions in the size of plant required and amount of fuel used, thus serving to restore the competitive balance in favor of coal, should not be lost sight of.

The necessity for the use of effective heat insulation materials in cases where the room temperature is to be maintained considerably lower than that of the outdoor air, has been realized by the refrigerating engineers for a great many years, and the principles underlying their use have been well established. These principles are not fundamentally different in the case of heating, where the room temperature to be maintained is higher than that of the outdoor air. However, the newness of this point of view to the public at large, the great number of materials subject to choice, and the sometimes conflicting claims in regard to the materials available, has resulted in considerable confusion on the subject, and an atmosphere of apparent mystery has been created where no mystery actually exists. The scope of this paper has, therefore, been restricted to a discussion of the fundamental principles involved in the comparison and selection of insulating materials without entering into any details concerning the specific properties of the materials themselves.

### General Principles

Heat always flows from a body at higher temperature to one at a lower temperature. A building with the contents at 70 deg. F. surrounded by outdoor air at a lower temperature forms such a combination, and it is obvious that there will be a continual loss of heat from the building. If the temperature inside of the building is to be maintained, it is evident that the heating system must supply the heat just as rapidly as it is lost. Further reflection also makes it evident that,

**Rigid fibre board has gained rapidly in public acceptance. The contractor should know that manufacturer's claims must be used discreetly. Use of insulation is not the final answer to economy, but how the material is used is the answer.**

no matter how efficient the heating system is, if the building is poorly constructed, thus losing heat rapidly, a large quantity of heat must be generated, and the heating cost will be high as compared with that for a better constructed building from which heat loss is less.

Part of the heat escapes from a building through the action of air infiltration. Wind blowing on the windward side forces cold air into the cracks around the doors and windows, and the same weight of warm air is forced out of the cracks on the other side. This escaping warm air has been heated by the heating system and so represents a fuel loss directly convertible into dollars and cents. Placing insulation in the walls will not correct this condition. The remedy is to calk all cracks in the window frames and either to weatherstrip the windows or install tight storm sash.

### Good and Bad Conductors

The remainder of the heat escapes by conduction through the glass, and through the materials forming the walls and ceilings of the rooms. The amount of heat conducted depends on the nature of the material, certain materials being better conductors than others.

Metals are the best conductors. Wood is a poorer conductor than stone, brick or concrete; while a dead air space, or one in which no air movement takes place, is practically the poorest conductor known.

In order to save heat, therefore, the solution of the problem lies in the use of the poorer conductors, or in the use of greater thicknesses of the better ones. In the older types of buildings, wood, brick, concrete and stone were considered sufficient for the purpose of insulation; but more recently the search has been for inexpensive materials to be used in addition, and which reduce the cost over what would be necessary if the thickness of the common building materials was increased to give the same degree of insulation. The regular structural materials, however, should be used to give the building strength. The insulating materials should be used in addition and not as a substitute for structural materials.

### The Coefficient Formula

Since the function of insulation is to prevent heat loss through the walls, floors, and ceilings, no evaluation of the benefit resulting from its use can be obtained without an understanding of the method for calculating such heat losses. The heat loss for a given type of wall is expressed in terms of an overall heat transmission coefficient, U representing the number of heat units passing through one square foot of the wall in an hour when a difference of one deg. F. is maintained between the temperatures of the air on the two sides of the wall. The commonly accepted formula for this coefficient is:

$$U = \frac{1}{\frac{1}{f_i} + \frac{1}{f_s} + \frac{n}{c} + \sum\frac{x}{k}} \quad \ldots\ldots\ldots\ldots\ldots\ldots (1)$$

in which U = overall heat transmission coefficient, B.t.u. per sq. ft. per hr. per deg. difference in temperature from air to air.

$f_i$ = inside surface film coefficient, B.t.u. per sq. ft. per ft. per hr. per deg. difference in temperature between inside air and inside surface (usually 1.34).

$f_s$ = outside surface film coefficient, B.t.u. per sq. ft. per hr. per deg. difference in temperature between outside air and outside surface (4.02 for 15 mi. per hr. wind).

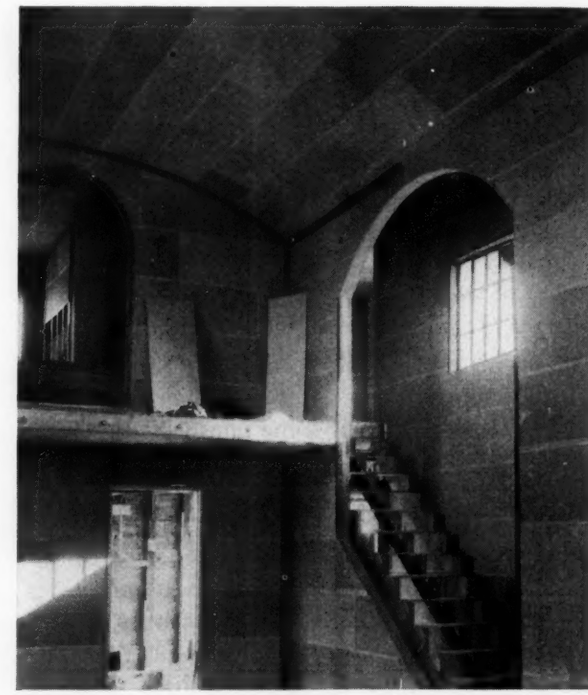
n = number of separately enclosed air spaces.

c = conductance of an air space, B.t.u. per sq. ft. per hr. per deg. difference in temperature between the two enclosing surfaces (1.10 for spaces greater than one inch).

x = thickness of material, inches.

k = conductivity of material, B.t.u. per sq. ft. per hr. per degree difference in temperature per inch of material.

$\sum\frac{x}{k}$ = sum of the separate values of x for each of the materials composing the wall.



**Insulation is valuable in ratio to the extent it is used. Where possible, it should be used in all walls, but certainly for all exterior surfaces.**

The values for $f_i$, $f_s$, c and k may be found in the American Society of Heating and Ventilating Engineers Guide for 1932 or in any handbook on heating. The total heat transmission per hour may be found from equation

$$H = UA\,(t_1 - t_2) \quad \ldots\ldots\ldots\ldots\ldots\ldots (2)$$

in which H = heat transmission, B.t.u. per hr.

A = wall area, sq. ft.

$t_1$ = temperature of indoor air, deg. F.

$t_2$ = temperature of outdoor air, deg. F.

For the purpose of comparing the relative value of various types of walls, however, the calculation of the values of U is sufficient and will be used in this paper.

### Conductivity

The ability of a material to conduct heat is expressed by the conductivity, k, or the heat conducted per square foot of surface per hour, per degree drop in temperature through one inch of material. This conductivity is a property of the material itself and is not influenced by the conditions of use. In general, low density, or weight per unit volume, is accompanied by

low conductivity. Still air is a poor conductor, and the better insulating materials owe their value to the fact that they are porous and thus contain a large number of dead air cells. Most of the insulators on the market have about the same proportion of dead air cells and, therefore, their insulating values, for the same thickness of material, are not essentially different. For all practical purposes they could be divided into three classes having conductivities of 0.30, 0.35, and 0.40.

It should be particularly noted, however, that while conductivity is a property of the material alone, the overall heat transmission, which is a measure of the actual worth of the material in service, is determined by the conditions under which it is used. Commercial insulating materials are made in different thickness, and this fact, combined with the rather common practice of comparing such materials on the basis of conductivities only has resulted in considerable confusion and error. A simple example will illustrate the fallacy of comparisons based on conductivity alone.

Assume that two ½-inch sheets of insulation are to be used as a wall with still air inside and a 15-mile per hour wind outside. The conductivity of one sheet is 0.30 and of the other is 0.40. Judged by conductivity alone it might be assumed that one sheet would transmit $\frac{0.30}{0.40} = 0.75$ of the heat transmitted by the other. However, under the conditions of service, each sheet is protected by the air film on the two sides and the overall heat transmission as calculated from equation (1) gives results, $U_1 = 0.376$ and $U_2 = 0.445$. From these it is evident that under the assumed conditions of service the better sheet transmits $\frac{0.376}{0.445} = 0.85$ of the heat transmitted by the other, instead of 0.75.

### Thickness of Insulation

The effect of thickness of insulation is obvious when insulations having the same conductivity are considered. It is not so obvious when the insulations have different conductivities.

Assume that a frame wall consisting of ⅝-in. clapboards, 25/32-in. sheathing, 3⅝-in. studding, wood lath and plaster, is to be insulated in one case by the addition of ½-in. insulating board having a conductivity of 0.30, and in the other by filling the studding space with a material having a conductivity of 0.40. If these materials were to be judged by conductivity alone, the fill material would transmit 1.33 times the heat that the board would. However, a calculation of the overall heat transmission from equation (1) gives a value of $U_1$, for the wall insulated with the board = 0.182, and $U_2$ for the filled wall = 0.082, thus proving that the wall insulated with the fill would transmit only 0.45 of the heat transmitted by the wall insulated with the board. In this case the relative values of the conductivities had practically no significance in determining the relative values of the walls.

Incidentally, the value of U for the original insulated wall would be 0.262. If the ½-in. insulating board were merely substituted for the sheathing, this value of U would be decreased to 0.238. Hence, it is evident that practically no benefit can be derived from the substitution of ½-in. insulating board for sheathing.

### Structure of Walls

A rather common misconception arises from the assumption that the same thickness of a given insulation is equally effective in all types of walls. That such an assumption is unwarranted is evident from the following example. Assume three walls, namely (1) a thin sheet metal wall, (2) an unplastered concrete wall 8 in. thick, (3) a brick veneered frame wall consisting of 4 inches of brick, 25/32-in. sheathing, 3⅝-in. studding, wood lath and plaster. Each wall is to be exposed to still air on the inside and to a wind velocity of 15 miles per hr. on the outside. The overall coefficients of heat transmission for the uninsulated walls are: $U_1 = 1.0$, $U_2 = 0.375$, and $U_3 = 0.191$, respectively.

If each of these walls is now insulated with one inch of material having a conductivity of 0.32, the new overall coefficients of heat transmission become $U_1 = 0.243$, $U_2 = 0.173$, and $U_3 = 0.119$. By forming the ratios of the heat transmission coefficients it may now be noted that the insulated sheet metal wall transmits 0.24 of the heat transmitted by the uninsulated sheet metal wall, the insulated concrete wall 0.46 of the heat transmitted by the uninsulated concrete wall, and the insulated brick veneered wall 0.62 of that transmitted by the uninsulated brick veneered wall. Thus it is evident that the effectiveness of a given thickness of insulation depends on the nature of the original wall, and that, in general, a given amount of insulation is relatively more effective in reducing heat loss through a poorly constructed wall than it is in the case of a well constructed wall.

INTERNAL CONDUCTIVITIES OF BUILDING MATERIALS AND INSULATIONS

| Material | Description | Density (Lb. Per Cu. Ft.) | Internal Conductivity ($C$ or $Cu$) |
|---|---|---|---|
| Balsa wood | Across grain | 20.0 | 0.58 |
| Balsa wood | Across grain | 8.8 | 0.38 |
| Balsam wool | Chemically treated wood fibre | 2.2 | 0.27 |
| Cabots quilt | Eel grass between Kraft paper | 4.6 | 0.26 |
| Celotex | Board form insulation made from sugar cane fibre | 13.5 | 0.33 |
| Corkboard | Pure; no added binder | 14.0 | 0.34 |
| Corkboard | Pure; no added binder | 10.6 | 0.30 |
| Corkboard | Pure; no added binder | 7.0 | 0.27 |
| Dry zero | Kapok between burlap or paper | 2.0 | 0.25 |
| Fibrofelt | Flax and rye fibre | 13.6 | 0.32 |
| Flaxlinum | Flax fiber | 13.0 | 0.31 |
| Hairinsul | 75 per cent hair | 6.3 | 0.27 |
| Hairinsul | 25 per cent jute | 6.3 | 0.27 |
| Hairinsul | 50 per cent hair | 6.1 | 0.26 |
| Hairinsul | 50 per cent jute | 6.1 | 0.26 |
| Hair felt | Felted Cattle Hair | 13.0 | 0.26 |
| Homasote Building Board (⅝" thick) | Wall Board made from paper pulp | 22.9 | 0.40 |
| Inso Board | Board form Insulation made from wheat straw | 17.0 | 0.33 |
| Insulex or Pyrocell | Cellular Gypsum | 30.0 | 1.00 |
| Insulite | Board form insulation made from wood pulp | 16.9 | 0.34 |
| Keystone Hair | | 11.0 | 0.25 |
| Linofelt | Flax fibers between paper | 4.9 | 0.28 |
| Lith | Rock wool, flax and straw pulp with binder | 14.3 | 0.40 |
| Masonite | Board form insulation made from exploded wood fiber | 18.0 | 0.33 |
| Maftex | Board form of insulation made from roots of licorice | 16.1 | 0.337 |
| Regranulated Cork | About ⅛" particles | 8.1 | 0.31 |
| Rock Cork | Rock Wool and Waterproof binder | 16.7 | 0.37 |
| Rock wool | Fibrous material, made from rock. Also made in sheet form, felted and confined with netting | 10.0 | 0.27 |
| Thermofelt | Jute and asbestos fibers, felted | 10.0 | 0.37 |
| Thermofelt | Hair and asbestos fibers, felted | 7.8 | 0.28 |
| Thermofill | Dry, Fluffy, Flaked Gypsum | 34.0 | 0.60 |
| Thermofill | Dry, Fluffy, Flaked Gypsum | 24.0 | 0.475 |
| Thermasote Insulating Board | Board form Insulation made from wood pulp | 20.8 | 0.374 |

# Twin Gas Furnaces Solve a Long Standing Trouble Job

**The two gas furnaces which brought heating comfort with forced air distribution**

CALIFORNIA and the rest of the country have exchanged a great many pleasantries on the subject of climate. Yielding the Golden State all that is due to it for its sun-drenched days, we may safely say that there are seasons when one wants heat for comfort after the sun has set somewhere beyond the rim of the Pacific.

Yet, strangely enough, there have been fine homes built where adequate provision for comfort was not made. The home illustrated in this article is an example. Built a number of years ago, it was an outstanding show place. It is a spacious mansion, located in one of the older exclusive residential districts, with extensive grounds surrounding it. Here was everything a man of means could possibly desire, except that all-important elementary comfort—warmth.

The original mistake was in the fact that this large house was provided with a basement in a remote corner, and a coal furnace was installed to operate by gravity only. Since some of the leader pipes were slightly over *sixty* feet long, and undersized, the results may be imagined without great effort.

### A Need Overlooked

It is true that years ago everyone considered Los Angeles as a place where one never needed heat; and probably the sheet metal contractor who turned heating contractor *pro tem* glowed at the vision of the added size of his contract, due to this rich man's whim in wanting any kind of a heating system in sunny southern California. He probably figured it would never be needed, so why worry? What he put

in, resembled a heating system, in that there was a furnace and pipes to the rooms. It was left to the psychological effect of knowing that the fire was burning in the basement, to keep the family warm. Certainly the heat reaching the rooms wouldn't be sufficient to do so.

The net result of the first few heating seasons was a badly abused coal furnace and much fuel consumed, but with no appreciable heat comfort in the house.

The next man to be called in had gas burners to sell. It was hoped these would heat the house where coal in the furnace had failed—without, however, correcting any of the fundamental mistakes in the installation.

Then along came the promise of effective heating in the form of an oil burner and furnace combined. This could not fail! At least so it was thought. But the results were the same—the house remained unheated.

Not one of these men had taken the trouble to see anything wrong except the absence from the picture of his favorite child, the appliance he was selling.

In the meantime years and years had passed. Gas stoves on tubing and electric heaters cluttered up this magnificent home, maids went around wearing sweaters over their uniforms, but no appreciable amount of heat had ever been supplied by the system originally intended to provide comfort in an otherwise satisfactory home. Children had actually grown to young manhood and young womanhood in a lovely home minus winter comfort.

The wonder of it all is that the owner ever again tried to utilize any part of his original investment for comfort. But "hope springs eternal in the human breast," and one day he called in the Payne Furnace and Supply Company to see what they knew about heating.

### What Was Done

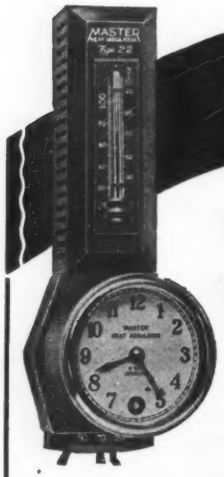
The most casual glance caused the engineer to wonder why those who had had this golden opportunity before him never attempted to couple automatic heating with forced air. It was the only solution, and quite obvious. It will never be known whether it was because previous heating men on this job didn't understand forced air heating, or were afraid to figure it and ask the necessary price.

Being guided by only that which was most desirable from the user's standpoint, the Payne engineer not only recommend forced air, but *two* complete systems, one gas furnace and blower for the first floor and one similar unit for the second floor.

Where gas furnaces are used, the unit system of heating is very desirable. In case like this, it is often most convenient, and quite a saving of fuel is made possible at times when it is not necessary to have the house at 70 degrees Fahrenheit on the second floor, but most desirable to have it at this temperature on the first floor.

By means of a push button furnace control em-

**This fine home in Los Angeles went for years without heating comfort until the installation described was made**



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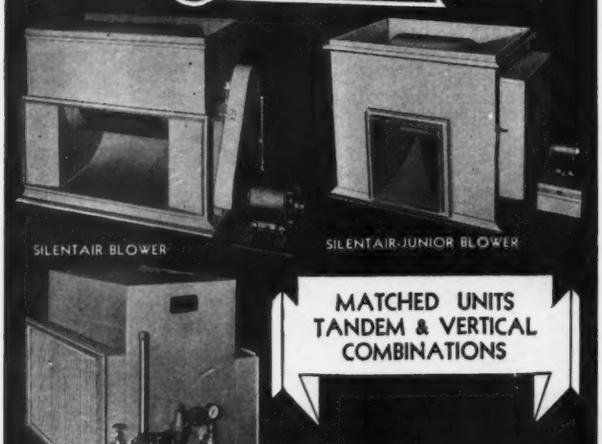


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bodying a relay connection, the fans start simultaneously with the turning on of the gas to the furnace burners.

For the owner's convenience, either or both furnaces and blowers can be operated from a central location on the first floor and the second floor.

The proposal was accepted, the two units installed, and the only service call during the season was when one room was getting too much heat and it was necessary to close the damper in the pipe to this room a little.

It is interesting to note the ridiculously small size of the leader pipes and register throats which exist on this job:

Living Room — 8600 cubic feet. Two 10-inch pipes and two 5x14-inch throats.

Dining Room—3850 cubic feet. Nine-inch pipe, 4x14-inch throat.

Hall—3450 cubic feet. Nine-inch pipe, 5x12-inch throat.

Five Bedrooms ranging from 1512 cubic feet to 3600 cubic feet with one 8-inch pipe each and all throats 4x12-inch.

Many of the pipes had been bady crushed by workmen who had been under the house in years past. These, of course, had to be repaired. The chimney to which the two furnaces were connected was badly sooted and dirty and since the vent gases from gas furnaces have a tendency to loosen soot and cause it to fall in great quantities, the chimney was thoroughly cleaned as soon as the old furnace was removed.

The weather was cold, something had to be done quickly, so there was a four day time limit for the complete furnace changeout. No extensive changes could be made in the way of enlarging throats, adding new registers or making several other desirable corrections.

Two full housed fans (multi-vane blowers) capable of delivering a sufficient volume of air against the resistance created, were used. Two ½ horsepower motors were required.

### No Returns

They were designed to give four air changes per hour in the rooms heated against a static pressure of ¾ inch. This pressure was estimated because there was no cold air return in the house and the resistance of the small pipes and throats added to the fact that four changes per hour would have to find its way out through cracks.

The fresh air intakes of the fans terminated in a window area where provision is made for air filters. Beyond this the owners would not go toward a complete air conditioning job. They "had to be shown" on heating comfort first, combined with simple but ample ventilation.

Needless to say this family is most appreciative, and most enthusiastic in their praises of this automatically controlled forced air heating job.

## Principles of Humidification

(*Continued from Page* 40)

of the shield was in place for a portion of the tests and raised at an angle for the balance of the tests. The open tank was equipped with a steam coil.

The rates of evaporation obtained were *lower than those secured from the warm furnace pans* as indicated by Fig. 4b. As these data were obtained under definite relative humidity conditions, shown in the graphs, it is possible to state that an increase in the relative humidity *decreases* the evaporative capacity. In other words *the higher the inside relative humidity the lower will be the evaporation obtained.* Furthermore, these curves show quite definitely that evaporation depends on the surface temperatures of the water.

While the steam coil in the open tank was more efficient than the pans in the radiator shields it is evident that these devices offer no improvement over the warm air furnace pans as a means of solving the residence humidification problem.

We are now in a position to state some definite conclusions regarding humidification of residences based on research information.

1—Warm air furnace pans, under gravity conditions, *will not furnish adequate evaporation capacity* to meet humidification needs *unless the residence is thoroughly weather stripped.*

2—*Without weather stripping the required capacities can probably be had by the use of a fan system.* If so, it is hardly possible that any pans except the dome and crescent would be satisfactory.

3—It is often difficult to check humidification requirements by calculation as there may be more sources of water vapor than the moisture in the outside air and the water which is evaporated.

4—Evaporation is controlled by *the air velocity over the surface of the water, the surrounding relative humidity,* the equivalent register temperatures where warm air furnace pans are concerned, the temperature difference between the inside and outside air, the dry bulb temperature of the surrounding air and *the surface temperature of the water.*

Due to the wide variation in the evaporative requirement, as well as the water vapor output for a warm air furnace installation humidifiers, when used, must be provided with a simple yet adequate control. Otherwise humidification will be excessive and condensation will result.

**What happens inside the house when we humidify by the customary means and how the process can be theoretically and practically checked are the main points covered in Mr. Tomlinson's December article.**

VACU-DRAFT
*offers*
COMPLETE COMBUSTION

VACU-DRAFT INSTALLED ON A WARM AIR SYSTEM »»»

1. *VACU-DRAFT pays for itself in greatly reduced fuel costs.*
2. *VACU-DRAFT provides positive automatic temperature control.*
3. *VACU-DRAFT insures a clean and dustless home.*
4. *VACU-DRAFT insures complete combustion.*
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8. *VACU-DRAFT in service in Canada for more than three years has proven its success by thousands of installations.*

FUEL saving these days is a matter of outstanding importance to home-owners. This fact coupled with the fact that the VACU-DRAFT by creating a draft in the natural way, brings about complete combustion, and full value from fuel consumed, is reason for the steady acceptance of VACU-DRAFT by home-owners everywhere.

In addition, VACU-DRAFT permits the burning of cheaper grades of coal, and affords maximum heat with minimum fuel consumption.

These money-saving features, features which pay for the VACU-DRAFT in a surprisingly short time, can be important factors to you in the building of your profit.

**DEALERS AND DISTRIBUTORS:** *Enjoy the profits which are following the display of VACU-DRAFT. Write at once for full information and territory open.*

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## HEAT CONTROL

Automatically opens and closes the draft and check doors of hard fuel heating plants at the demands of a thermostat. Provides COMFORT, CONVENIENCE, HEALTH, SAFETY, and FUEL ECONOMY.

**QUICK TURNOVER**

97 out of every 100 homes are prospects.

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It carries a long margin of profit—sufficient to pay for aggressive selling effort and still allow a liberal net profit.

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60,000 units giving satisfactory service.—Listed as standard by The Underwriter's Laboratories. —Approved by the Anthracite Institute and backed by thirty years of electrical manufacturing experience.

**WRITE TODAY**

for our complete merchandising plan on Cook Heat Control, Limit Control, Relays, Electric Clock Thermostat, Stoker Controls, etc.

*This is an opportunity. There is a demand for automatic heat. Supply that demand with Cook Heat Control.*

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*Continue to get this service!*

THOUSANDS of heating dealers are finding Automatic Heat and Air Conditioning Dealer filled with the kind of merchandising, technical and financial information that they wanted.

This combination of automatic heat and air conditioning is revolutionizing the American conception of comfort in the home and smaller business establishment.

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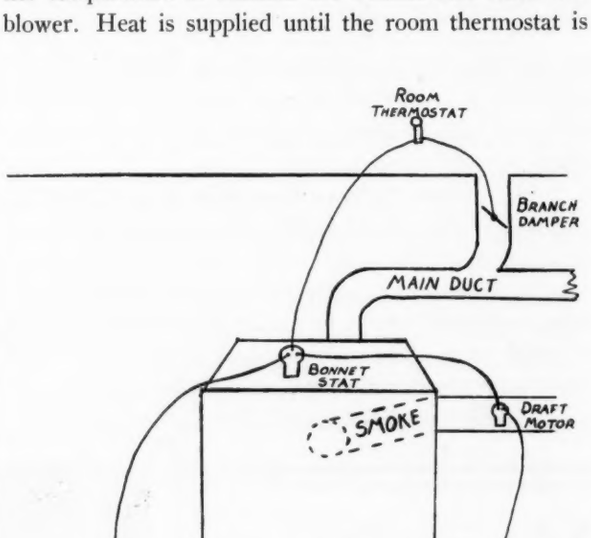
# A Simple Individual Room Control

THE sketch with this article shows a hookup where individual control is used for one or more rooms which must have closely controlled temperature.

An individual thermostat is placed in the room to be regulated and connected two ways—one lead to the central fan and a second lead to a motor operated damper in the branch supplying heat to the room.

In this arrangement the bonnet stat operates first to open the ash pit draft. When a pre-determined bonnet temperature is reached the bonnet stat starts the blower. Heat is supplied until the room thermostat is satisfied. The thermostat then starts the motor to close the branch damper.




**The drawing shows how the instruments are placed and how the hookup is made. The idea is to give a room individual control without special instruments. The remainder of the system can be controlled by one or more thermostats**

When all the rooms having thermostats are satisfied or when the one thermostat is satisfied, the dampers are closed and the rapidly rising bonnet temperature affects the bonnet stat which shuts the draft door and stops the fan.

This system throws the entire plant on the one room or rooms hard to heat. Another feature is that there can be a quantity of warm air in the bonnet and trunks or even going to some rooms although the thermostat room may be shut off by the damper.

## Review of "Domestic Air Conditioning"

Air Conditioning for Comfort, (Engineering Publications, Inc., Chicago) 244 pages. $2.

One need has been clear to Engineering Publications during the past year—the need for an authoritative study of the problems of air conditioning as applied to human comfort. From all sides have come inquiries indicating a widespread interest, coupled with a lack of information. It was determined, therefore, to secure the services of the most logical man to prepare such a book.

The result is "Air Conditioning for Comfort," written by Samuel R. Lewis, widely known as a consulting engineer.

It is indicative of the practical viewpoint which Mr. Lewis adopted that he has insisted throughout the book on the thought expressed in his preface: "Heating systems are considered in this book along with cooling systems," he says, "because of the very close relation between the two, and because it appears inevitable that the best cooling systems of the future will be those, the designing of which was borne in mind when the heating system, with which it co-ordinates, was designed."

The book deals first with the fundamentals of heating and cooling for human comfort. It then treats of the formulas for computing the various factors. The book closes with the application of the principles and formulas to two residences and a restaurant.

Many tables, charts and drawings, together with the formulas developed, will be of great assistance to the reader in his progress. The man possessing a reasonable grounding in simple mathematics, and familiar with the application to heating of the laws which govern heat transmission, the conveying of fluids and gases, and with combustion, should find no difficulty in following the logical arrangement of the material in the book.

The twelve chapter subjects are as follows: 1—Explanation of Terminology; 2—Instruments of Service in Air Conditioning; 3—Relation of the Human Body to Air Conditioning; 4—The Influence of the Type of Heating System upon Air Conditioning; 5—Heat Transmission Through Building Materials; 6—Calculations for Air Conditioning Requirements; 7—Sunshine, Evaporation, Air Leakage and Lighting; 8—Air Distribution Within the Rooms of Cooling Systems; 9—Controlling the Temperature in Air Conditioning Systems; 10—Water Circulation in Heating and Cooling Systems; 11—Air Ducts in Heating and Cooling Systems; 12—Computations for an Actual Design.

All types of equipment are described, together with their operating principles. Heating systems using both boilers and furnaces to generate heat energy are adequately treated with reference to their application to air conditioning installations.

The complete index includes a listing of the formulas and tables. Fastened to the inside of the back cover is a Bulkeley psychrometric chart, the use of which is carefully set forth in the pages of the book.

Mr. Lewis's qualifications for the job are numerous. He is a pioneer in the application of cooling to larger structures. He has designed the heating and ventilating systems for the schools of Toledo, Ohio, for twenty-four years; and for those of Columbus, Ohio, since 1913. During these years he has carried on a consulting practice in heating and ventilating. He is a past president of the American Society of Heating & Ventilating Engineers, and has been chairman of the committee on research, and the committee on that association's Guide.

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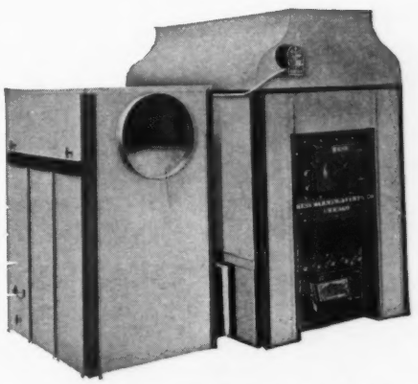

THE IDEAL COMBINATION

Hess Welded Steel Furnace with Hess Air Conditioner

The Hess Welded Steel Furnace and Hess Air Conditioner are different and Hess Dealers are doing an increasing, profitable business. Better than others because the Hess line is more salable and offers the most to the user.

There are hundreds of prospects in every community who can be sold air conditioning, if approached with the right equipment at a price they can afford to pay. As shown in the accompanying illustration, the Hess Dealer can offer a complete unit—welded steel furnace and air conditioner—or either one separately in the case of remodel jobs.

Write today for full particulars and dealers' prices. It is not too late to cash in on the business within your reach if you will act at once.

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## MINNEAPOLIS-HONEYWELL

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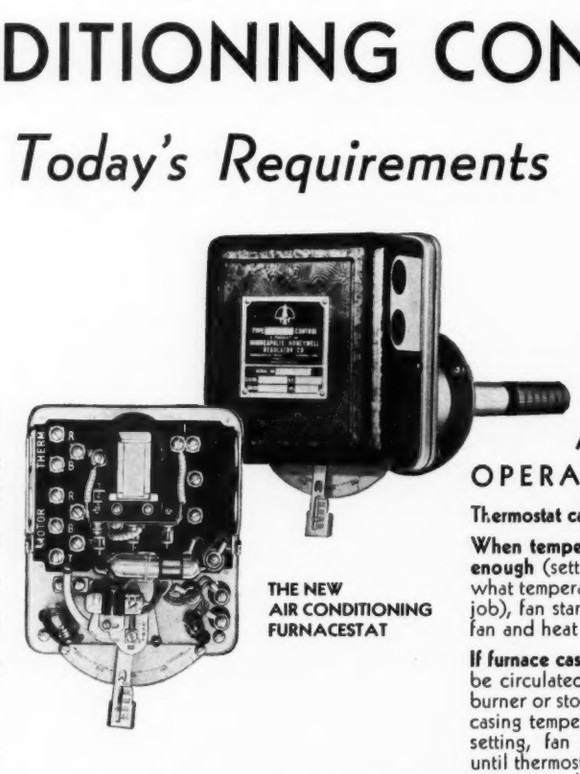
# AIR CONDITIONING CONTROL

## *for Today's Requirements*




**THE NEW AIR CONDITIONING FURNACESTAT**

THE new Minneapolis-Honeywell Air Conditioning Furnacestat is the most universal and flexible control of this type on the market. It accurately governs the room temperature by coordinating the motion of air and the source of heat or cold to meet any required operating schedule.

In addition to this general function, this newest Minneapolis-Honeywell product acts as a limit control to maintain correct furnace temperatures, and as a safety device to prevent overheating. It also acts as a summer cooling switch to regulate air motion, with or without washing, but without operating the heat source.

Its full range of duties, adaptability to every type of air conditioning system using control of temperature and air motion, coupled with its all around performance and the reputation enjoyed by Minneapolis-Honeywell products make the new Air Conditioning Furnacestat the only real control for today's requirements. Minneapolis-Honeywell Regulator Company. Executive Offices, 2726 Fourth Avenue South, Minneapolis, Minnesota. Factories: Minneapolis, also Elkhart and Wabash, Indiana.

### A TYPICAL OPERATING SCHEDULE

**Thermostat calls for heat.**

**When temperature in furnace casing is high enough** (setting of instrument predetermines what temperature is necessary for individual job), fan starts. When thermostat is satisfied, fan and heat source are shut down.

**If furnace casing is too cool** for air from it to be circulated, drafts open or the gas or oil burner or stoker is turned on. When furnace casing temperature is raised to fan control setting, fan starts. Fan continues to run until thermostat is satisfied. If meanwhile furnace casing heat rises to setting of the safety limit control, source of heat shuts down until casing temperature drops. When thermostat is satisfied, both fan and heat shut down.

**To protect against extreme over-heating** of furnace, fan starts when temperature exceeds high limit control setting by approximately 50° even though thermostat is satisfied, thus drawing off excess heat which would damage furnace.

**For Summer use** it is only necessary to move the outside indicator to summer setting. This cuts out source-of-heat controls and causes fan to circulate air when room temperature rises above thermostat setting.

• • •

**This is only one of several series, of operating functions of which the new Air Conditioning Furnacestat is capable. It can be adapted to any required series or sequences of control.**

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# MINNEAPOLIS-HONEYWELL

## *Control Systems*

# ASSOCIATION Activities

## Cleveland Association Resumes Meetings

The Moncrief Dealers Association of Cleveland, Ohio, announced that regular twice a month meetings began September 12 and will continue through the winter months.

This organization is composed of Cleveland furnace dealers who sell and install Moncrief furnaces. The organization has been in operation for several years with its chief aim better installation and better prices for heating work.

H. S. Sharp, vice president of the Henry Furnace and Foundry Company, who has been active in the affairs of the association states that this winter speakers of known reputation will be invited to discuss problems of the industry. The first speaker was E. B. Lau of the Lau Heating Service, Inc., of Dayton, Ohio.

Meetings will be held on the second and fourth Mondays of each month.

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At one Spring meeting of the Milwaukee furnace and sheet metal men, Henry Hatton, Jr., of the engineering department of L. J. Mueller Furnace Company delivered an excellent talk on present day forced air heating or semi-air conditioning.

The points touched upon were the estimating of a forced air conditioning system as installed in a residence. Starting with the inception of a plan, due stress was laid upon calculating the B.t.u. loss of the structure, paying particular attention to the type of construction, making due allowance for various types of insulation, storm sash, ceiling losses; taking into consideration whether attic spaces were floored or not.

Air quantities required for each room were discussed; based on various entering temperatures, sizing of heat and return risers, to deliver the required quantities on pre-determined static resistance, sizing of main heat and return ducts, making due allowances for filters, washers and heater casings, checking total resistance encountered against fan data, to be certain fan will deliver the required volume against the total resistance.

Register locations were recommended at one foot below ceiling for all heat inlets and in base at floor for return outlets, each room to be provided with individual return. Higher velocities were recommended for overhead inlets than could be safely applied for heat registers located in base. Mr. Hatton asserted overhead locations are desirable in the event of future installation of cooling equipment allowing the cool air upon entry into room to thoroughly mix in descending from outlet to floor; this could not be accomplished by base inlets. The cool air upon entry into room would lie dormant on floor and would not remove the accumulated heat in the upper strata of the room.

Particular stress was laid in locating heat inlets in positions to force the incoming air against the outer wall surface, this surface being cold in winter and warm in summer. The locations would apply in both heating and cooling.

The flush type forced air register was discussed, being inconspicuous when decorated to match various painting schemes.

Volume dampers and their location and purpose were also discussed in connection with balancing the system.

Blower type casings, their construction for forced air systems to create positive impingement of all air upon heated surfaces and hood take-offs were also gone into; also fan transition connections to heater casings. In fact the job was built up from figuring the heat loss to a finished design, indicating all heat and return locations, heater, fan, washer and filter; a layout which could be submitted to the owner with the contractor's bid, whereby the owner could tell at a glance the various items and locations, going into the make-up of the air conditioning system figured for his home.

◆

## Indiana Begins Winter Meetings at New Castle

IF THE Sheet Metal interests seek to elevate the standards of the industry, then the medium of District Meetings should not be overlooked. The Indiana District Meetings this year have served a definite, constructive purpose. Helpful information has been literally brought to the trade right in its neighborhood. Discouraged sheet metal contractors have found reasons to study up on salesmanship and have resolved to improve the quality of their work both as regards materials used and the workmanship.

The purpose of the district meetings did seem to be social—just friendly, get-together, good-will meetings. However, during this period of few orders and many outstanding developments, the needs of the trade are for enlightenment rather than for entertainment. Social features are automatically a part of every dinner meeting, but in Indiana, the stress is being increasingly placed upon improvement.

A spirit of friendliness permeates the Indiana meetings where salesmen competitors and dealer competitors join for the common good. The New Castle, Indiana, meeting, August 26th, was held at an old country hillside home. The crowd assembled beneath the pines during a gorgeous sunset. An old time chicken dinner caused belts to slip into seldom used notches.

Harry Jones, of the new Jones-Jordan, Inc., cleverly introducing each guest. Bob Rennick, formerly of the Standard Metal Company was introduced as representing the Indianapolis Machinery & Supply Company and he had with him M. A. Feinberg, the treasurer of the company. W. J. Holliday Company, also new in the field, were represented by Herman Schmidt who was formerly with the Standard Metal Company.

After dinner, more comfortable chairs were found in the spacious living room and a most informative program unfolded under the direction of Nelson Miller, the District Governor. The mayor of New Castle welcomed the group, then H. D. Warfield of the Ingersoll Steel & Disc Company told the story of IngOclad—a new two-ply metal having a stainless steel surface with a backing of carbon steel. The two metals are perfectly fused together.

Arthur Frazee of the Rudy Furnace Company talked on Air-Conditioning and gave valuable information, but of even greater importance was his message on salesmanship. Long applause followed his speech. After a short informal period, the meeting adjourned with everyone in a most constructive frame of mind and determined to "go out and do something about it."

# Report of Meeting of N.A.S.M.D.

THE meeting of the National Association of Sheet Metal Distributors convened at two forty-five o'clock on Tuesday afternoon, October 18, 1932, in the Marlborough-Blenheim, Atlantic City, N. J., with approximately one hundred in attendance and President A. W. Howe presiding.

The opening remarks of the President stressed optimism and advised confidence in the future.

Gilbert L. Lacher, Managing Editor of "Iron Age," New York City, addressed the meeting on "The Production and Consumption of Steel in the United States. What Will Be the Future Trend?"

R. B. Shearer, Chairman of the Sheet Steel Committee, reported that a joint meeting had been held in the morning of the committees from the American Steel Warehouse Association, the National Flat Rolled Steel Association and the National Association of Sheet Metal Distributors, at which it was recommended that a further committee of two members from each of the associations present go into further consultation in an endeavor to outline an acceptable program to all three associations. The president appointed as the committee of two to represent the National Association of Sheet Metal Distributors, R. B. Shearer and F. O. Schoedinger.

W. N. Deere, Chairman of the Tin and Terne Plate Committee presented his report, which contained a recommendation to the Association which that body adopted. This report stated that the volume of Terne plate has fallen off considerably, due, of course, to existing economic conditions, but mostly because of the inroads made by composition roofing materials such as tile, slate, asbestos and other types of shingles, etc. Further, because of a lack of roofing mechanics to install tin roofs. The report asks for concerted action by the Association and recommended that the Association conduct an advertising campaign, direct by mail as well as in the trade papers, reaching the sheet metal contractors. The Association approved of this report, including the recommendation.

Thomas J. Doherty, Counsel of the American Iron and Steel Institute, New York, who was to address the convention on "The Foreign Dumping of Steel and Steel Products," was unable to be present. His paper, however, had been forwarded to the Secretary, who read it.

R. J. Smith, Chairman of the Copper and Brass Committee presented his report, which was accepted.

There was a general discussion of the copper situation, followed by a discussion of the distribution of sheet metals.

The Eaves Trough and Conductor Pipe Committee had no report to offer.

President Howe brought up the matter of establishing new lines of merchandise to build up volume. Items suggested were aluminum, stainless steel, and warm air furnaces.

Mr. Howe made the suggestion which subsequently led Secretary Fernley to announce a mail poll of the membership, asking them to list all the new products or lines they have taken on to sell in the past two or three years. Mr. Howe said it was necessary that any organization such as their's continually keep adding new lines for their salesmen to sell. Changing conditions, etc., and the fact that it is necessary for a jobber to sell what his customer is buying means the jobber must keep posted and for this reason Howe was asking for information as to what other jobbers found they could successfully merchandise.

E. A. Scott mentioned a new boiler which might be used as one new line, and suggested that the growing interest in air conditioning points surely to better insulation. The Southern roofers already have taken advantage of this and are handling a great deal of insulating material. He also suggested the advisability of making connections with companies which make merchandise of the one-sale, non-repeating type, such as vacuum cleaners for cleaning furnaces, an item on which it is too expensive for the manufacturer to carry a traveling sales force. The roofing and heating contractors are already getting into this business.

Ed Wilson, of Treman, King & Company, Ithaca, N. Y., suggested as new lines electric refrigerators, electric ranges, and electric lamps and bulbs, stressing the point of good turnover in those.

Secretary Fernley suggested canvassing the members asking what new lines they have added in the past two or three years, which have been found unsatisfactory and have been discarded, and so forth, a report to be issued when this information is received and compiled.

There were no resolutions presented and no further business transacted. There were no exhibitors.

**In boom times associations—national, state and local—enjoy enlarged membership and enthusiastic cooperation. But in hard times membership falls away and the booster turns critic. The basic reason is that in boom times every member gets his share of work and profits while in hard times there is never enough work to go around. There is no argument that this makes operation difficult for the association. What has your association done to keep interest alive and accomplishment active? Write us.**

# DISTRIBUTORS news

## A Basis for Judging Trucking Cost

IN an endeavor to establish a practical basis for judging trucking expense a questionnaire was mailed to members of the National Association of Sheet Metal Distributors with the request that expenses be listed and comments on costs entered. From replies received the following important facts were established:

There are many influences which must be taken into consideration before making a direct comparison of one set of trucking cost figures with another.

One of the most important factors is the actual operating conditions which vary considerably. For instance, a truck operating on long hauls should show a much lower operating cost per mile than one operating on short hauls. The type of road, traffic conditions, weather, climate, season of year, period covered, age of trucks, whether equipped with solid, cushion, or pneumatic tires, etc., all have their affect on trucking costs.

A striking point is noted in the wide range and many variations in the replies, indicating a vast difference in the manner of record keeping of a very vital portion of the cost of doing business.

The report shows:

1. That 85 per cent of reporting members own and operate their own trucks.

2. That the average weekly cost of operating one and one and a half-ton trucks is $43.00.

3. That the average weekly cost of operating three-ton trucks is $62.00.

4. That five-ton trucks have practically been discarded, a very few being used in hauling heavy loads from station to warehouse.

5. That many houses are making free delivery within the city limits only.

6. That the general average of free delivery service is about five miles from warehouse. There are a few exceptions as some houses are delivering to customers twenty-five miles distant, and two houses even a greater distance.

7. There seems to be a marked tendency to curtail long distance, free deliveries.

The trucking expense as reported by one hundred and eighteen firms shows a wide variation, the general average being .72 per cent of sales.

In making up Overhead Expense Reports it is suggested that the following factors be taken into consideration.

1. Interest on money invested in trucks.
2. Gasoline.
3. Oil.
4. Registration.
5. Driver's wages.
6. Tires.
7. Repairs.
8. Depreciation.
9. Insurance (Fire, Theft, and Liability) Garage (Rent, heat, light, water, mechanics).

It is interesting to note that some firms do not own their own trucks. One house in the East reports that they contract their trucking, paying $14.00 per day for a two-ton truck, $15.00 for a three-ton truck, and $17.00 for a five-ton truck, and have reduced trucking expenses by using only the number of trucks necessary each day.

Another house reports paying $16.00 to $18.00 per day.

A house in the Middle West uses a trucking company for inbound freight, paying 90c per ton. Another house in that same area contracts for their hauling to and from stations at $1.00 per ton, and a house on the Missouri River on the same basis.

Another house in the Central West contracts their trucking on the basis of $9.75 per day for a one and one-half-ton truck.

Some interesting methods for reducing trucking expense are reported in the following quotations from questionnaires:

"We have worked out a schedule on a mileage basis covering the charges per 100 pounds on delivering outside the free zone. It is our purpose to make the deliveries self-sustaining."

"Working with local competitors in keeping down distance deliveries and using lighter trucks."

"By operating with 1 man to a truck. By getting competitive bids on inbound contract."

"A great many customers call for their own merchandise now in a radius of 100 miles and save our shipping."

"Eliminate free deliveries outside of city."

"By combining all orders going route travelled."

"Common sense teaches us to make no deliveries over 1 mile from store. We use trucking expenses for dividends."

"Changing equipment from $2,500 class to $1,000 class."

"We own our own trucks and last year, that is for 1930, we operated 1 1-ton truck and two 1½-ton trucks at a total expense for the three trucks for the year of $5,258.83, including everything, depreciation, etc."

"Practically eliminated use of one-five ton truck, as railroad company delivers to our warehouse and hauls practically 50 per cent of our outgoing freight by truck."

"Routing and Zoning: Drivers assigned regular routes thus becoming familiar with requirements at each stop."

"Combining deliveries. The truck companies are now beginning to call for all deliveries and we are thinking of doing away with two-thirds of company-owned trucks."

"By keeping a daily route sheet for each driver as follows: Starting time, direction, stops, weight, distance, time returned."

"Adoption of definite delivery schedules and elimination of haphazard deliveries."

"1. Urging our customers to call at our Call Department. 2. Having trucks making delivery to surrounding territory call for merchandise. 3. For our own trucks to adhere to regular schedule of deliveries. 4. Phoning our customers for additional orders before making delivery to their stores."

"To contract for our trucking on a tonnage basis."

"The largest item of course is wages paid to drivers which have been cut 10 per cent, then using good oil and gasoline and maintaining a good mechanic, the cost of trucking is kept at a minimum."

# New PRODUCTS

## New Heat Control Offered

A new heat control which automatically maintains day and night temperatures and is self starting and winding is offered by Hart and Cooley Manufacturing Co., 61 West Kinzie St., Chicago.

The control consists of a room thermostat, an electric clock time switch and an electric motor.

The thermostat is said to be very sensitive and housed in a case which is dust tight. The switch is designed for mounting in the basement near the motor. The motor is of the induction type with circuits made by contact in the motor to prevent arcing.

Full information is contained in literature which the company will mail contractors.

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## Cabinet Sinks of Monel Metal

The growing trend towards the use of cabinet sinks in large as well as small kitchens has resulted in the development of a line of Monel Metal models in ten different double drainboard and one single drain board sizes. They are especially adapted for the apartment house where the saving of space is an important consideration.

In style the new cabinet sinks follow in a general fashion that of the "Straitline" self supporting sink models announced several months ago. They are made of the same gauge metal and are reinforced with heavy plate under the drainboards. Under portions, including bowl and drainboards, are backed up further with sound deadening material.

Sizes of the double drainboard models range from 60 inches to 117 inches in length. The single drainboard models are 48 inches in length but are furnished in right and left hand drainboard types. All models are 25 inches wide, a width sufficient to allow for a slight overhand that permits the person working around them to stand close without bending as would be the case if cabinet and sink were flush. Bowls are of solid one piece construction. The drainboards are without flutes to provide the maximum in working surfaces and have an integral back splash 1½ inches high. End and front rims protect the floor from water splash. In addition an optional back splash is provided that forms a sanitary overlapping joint when bolted to the integral back splash.

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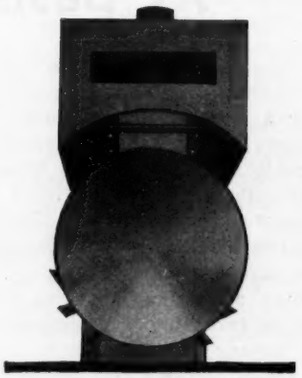
## Junior Size Oil Furnace

A new Junior size steel furnace designed specifically for oil burners and composed of a large, drum-type combustion chamber and a rectangular economizer radiator is now being marketed by the Health Air Division of the Economy Baler Company, Ann Arbor, Mich.



The Junior furnace features an extra large radiator, called the economizer, and radiating fins along the sides of the drum. These fins are solidly welded to the drum and strengthen the drum, provide additional radiating surface and guide air flow upward.

Details of construction and operating characteristics are contained in a leaflet which can be obtained from the company.

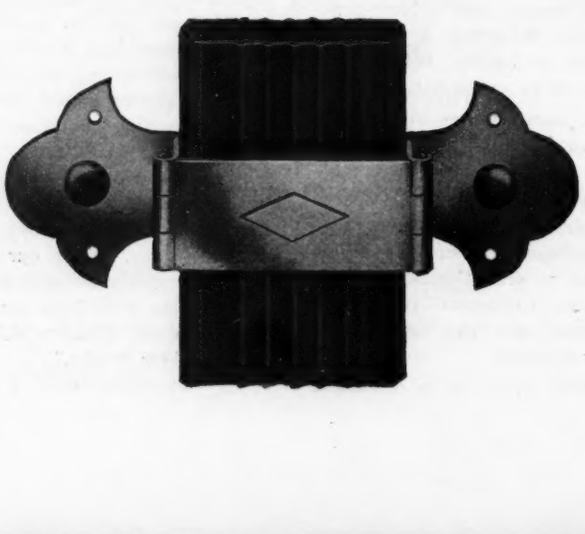
◆

## Hinged Bronze Leader Strap

A new leader strap of bronze is announced by David Levow, 308 West 20th St., New York City.

The strap is made of ⅛-inch thick bronze allowing for leader to stand away 1 inch from wall and is provided with screw holes so that strap can be fastened to the wall by means of expansion bolts in the joints between bricks. The strap is so constructed that by removing a pin the leader can be replaced if necessary without removing strap from wall.

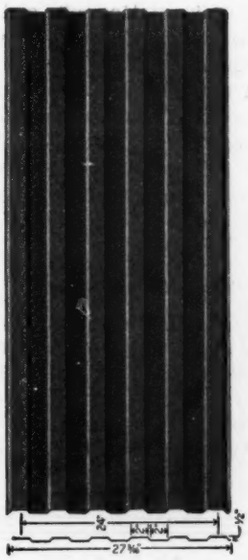
These straps are being carried in stock for 3x4 inch square corrugated leader and other sizes will be made.



## Flat Faced Corrugated Sheets

The Milcor Steel Company has recently announced its A-One Siding, a sheet of fabricated siding material which has every advantage of ordinary corrugated metal, and in addition is formed in flat topped corrugations.

Each sheet of A-One siding has six ribs running the long way of the sheet. These ribs are flat on top and two inches wide. Between each rib, more than a half inch deep, is an indentation two inches wide. The connecting metal is formed at a slight angle. The design of this siding is outstanding because of its alternate highlights and deep shadows which produce a most striking effect.




It is an appropriate material for any of a hundred different uses and may be applied with ribs in either horizontal or vertical position. The entire sheet is 27⅛ inches wide and the covering width is 24 inches. This allows for complete overlap of one rib as sheets are being applied.

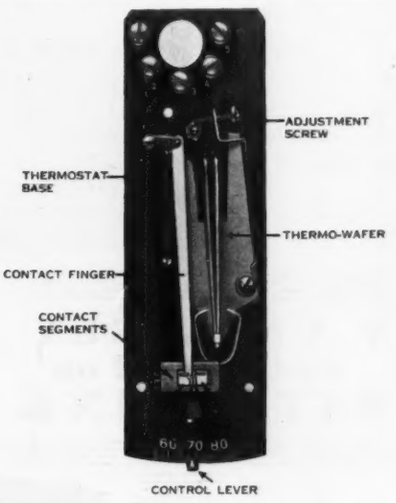
Descriptive circular on A-One Siding, illustrating many uses and giving specific information, will be sent upon request to the Milcor Steel Company, Milwaukee, Advertising Division.

◆

## Low Priced Regulators

The White Manufacturing Company, St. Paul, Minnesota, has recently announced two new low priced damper regulators. Type 144 employs the method of gradual control, opening and closing dampers of valves to four distinct positions directly from room temperature variations. The thermostat supplied with this regulator employs a double thermal wafer which imparts its action to a contact finger which slides over a series of contact segments thus closing the various electrical circuits and causing the motor to take its several different positions.

Type 122 employes the conventional method of operation being a two position regulator. The thermostat supplied with this type employs a thermostatic blade and contacts. Both are furnished in Plain and Clock Models.



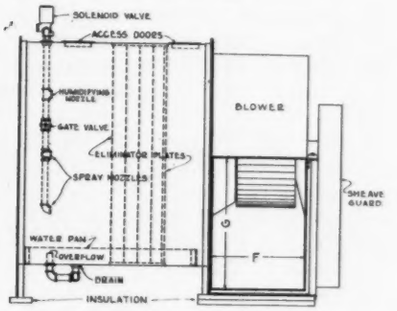

◆

## Domestic Air Conditioner

A domestic air conditioner designed especially for small installations and consisting of a blower, spray chamber with eliminator plates with the blower pulling through the spray chamber is announced by the Autovent Fan and Blower Co., 1805 North Kostner Ave., Chicago.

The complete unit is compactly arranged to occupy a minimum of floor space. The spray chamber contains from one to three spray nozzles and one humidifying nozzle with a valve between so that both or one of the sets of sprays may be used.

Incoming air is introduced at the face, passes through the spray and then through four-turn eliminator plates. From the chamber the air is pulled through the blower, of the multi-blade type, and discharged at the bottom of the housing.




Sizes range from 1500 to 3500 C. F. M. A larger cooling unit with from 3 to 20 nozzles and 2500 to 7500 C. F. M. is also offered. Full information may be secured from the company.

◆

## A New Humidifier

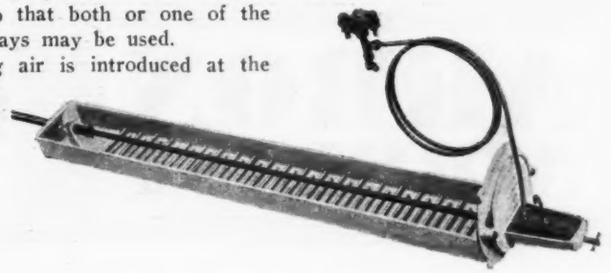
A new humidifier which has been under operating tests for several months is announced by the Wisconsin Humidifier Company, 3373 North Holton St., Milwaukee, Wis.

The humidifier consists of a bonnet pan designed for installation across the bonnet and above the castings in the hottest section of the air chamber.

The operating principle differs from other humidifiers of the same general type in that the water level is maintained by expansion and contraction of the pan itself. The pan is cast aluminum with a fluted bottom. A rod passes the full length of the pan and supports the water valve which is located in another pan outside of the casing. An adjustable tension is provided to control the surface area.

The humidifier is designed to operate with about one-eighth of an inch of water. As the water evaporates the pan expands, thus opening the valve. When the water flows into the pan the pan is cooled and contracts thus shutting off the water flow.

The humidifier is sold complete with pan, valve and necessary piping. Details are contained in literature which may be obtained from the company.



# News Items . . . . . .

## Jos. Gardner to Be Honored

Preparations are being made to entertain some 200 to 250 sheet metal contractors and material men of Indiana and out of state on Wednesday evening, November 16th by Jones-Jordan, Inc., Indianapolis, with an open house in celebration of the Joseph Gardner Company's 50th year in business.

The guests of honor will be the present head of the Joseph Gardner Co., Jos. C. Gardner and his son, Edward Gardner, who is also active in the business. The firm was established 50 years ago by Joseph Gardner, Sr., father of Jos. C. Gardner and grandfather of Edward.

Joseph C. Gardner is nationally known among sheet metal contractors, having served as director and as president of the National Sheet Metal Contractors Association, and its present treasurer. Many of his friends from out of town will be on hand to offer felicitations. Invitations are being sent to officers and members closely affiliated with Mr. Gardner in the State and National organizations.

The meeting is set for from 7:00 to 9:00 P. M. at the offices of Jones-Jordan, Inc., 631 South Delaware Street, Indianapolis.

◆

## Armco Band on the Air

The Armco Symphonic Band returned to the air at 9:00 p. m., E.S.T., on Tuesday, October 25th, over Station WLW, of Cincinnati, for its fall and winter series of programs.

Differing from the usual conception of a band, both in instrumentation and technique, the Armco Band is of symphonic proportions. Critics have frequently referred to it as "a symphony in brass." Most of the Armco musicians are symphony players who have performed under the direction of the greatest living conductors.

These popular half-hour concerts will be introduced each Tuesday night, at 9 o'clock, with martial strains from Tschaikowsky's Fourth Symphony.

◆

## I. W. Rowell Addresses Rotary

On September first, I. W. Rowell, manager of the Lakeside Company, addressed the Rotary Club of Menominee, Michigan, on the future and present status of air conditioning, especially for homes and small commercial buildings. As a result of this address, Mr. Rowell has received invitations from the Rotary Clubs of Marinette and Green Bay, Wisconsin and Escanaba, Iron Mountain, Houghton, Marquette, Munising, Michigan.

The addresses stressed the need for thorough public education on air conditioning and emphasized the point that the public should not expect the impossible or demand theater conditioning for the small amounts of money now considered sufficient for the average residence.

◆

## Dreis & Krump Appoint Distributer

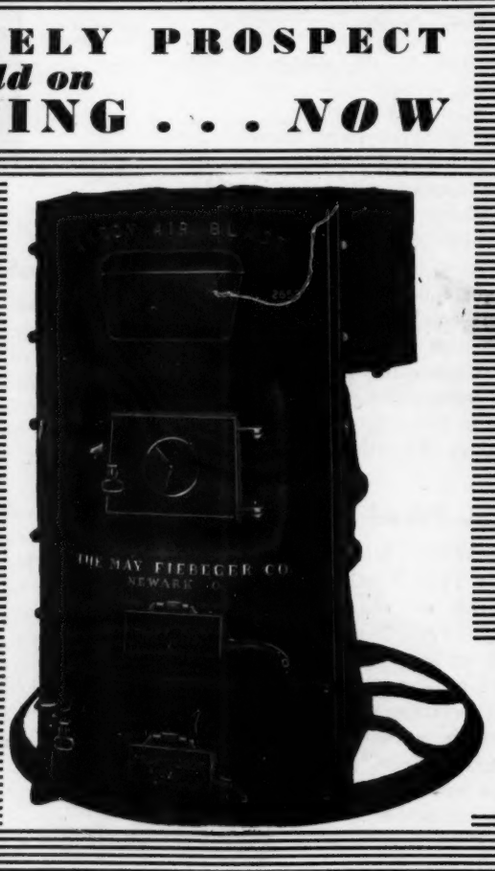
Dreis & Krump Mfg. Co., Seventy-fourth Street and Loomis Boulevard, Chicago, sheet metal working machinery manufacturer, has appointed Parkett Machinery Division, Austin-Hastings Co., Inc., Cambridge, Mass., as exclusive distributer for its line of steel power brakes, power presses and power shears in the New England territory with the exception of Connecticut.


**YOUR MOST UNLIKELY PROSPECT**
***can be sold on***
**AIR CONDITIONING . . . *NOW***

**THE possibility of a complete air conditioning installation is considerably enhanced by features of known merit found in the AKRON AIR BLAST, a single unit that performs its air conditioning functions 100%.**
**Materials and workmanship, plus scientific design combine to make for unequalled efficiency in performance.**

***Write today for full details of the AKRON AIR BLAST.***

**The MAY-FIEBEGER CO.**
**NEWARK OHIO**




**AKRON AIRBLAST**

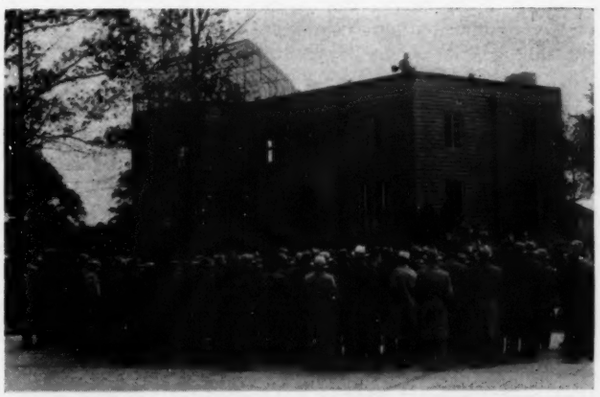
# News Items . . . . . .

## Dedicate Steel House

Dedication ceremonies marking the completion of the first frameless steel house built by a newly developed construction method which may be the forerunner of better homes at lower cost occurred in a Cleveland suburb on October 12, at 2:30 P. M. Charles R. Hook, well-known steel executive and president of The American Rolling Mill Company, of Middletown, Ohio, made the dedicatory address.

Paying a glowing tribute to those who have developed this new and original building method, before a gathering of architects, engineers, and industrial executives, the steel manufacturer said:

"The inventors and builders of this house had to strike out boldly into an uncharted and untrodden wilderness.



They visioned this modern house long before a drawing was rendered or a process devised to form and assemble the metal parts.

"This may well be a propitious day, not only for home makers, but for architects, realtors, building contractors, and the many diverse industries and businesses that contribute to the building and equipping and financing of the American home. What this house means to the public whose interest is centered on the housing problem both in dwellings and the rebuilding of the blighted areas of cities is a matter of conjecture. What it means to the producers of iron and steel and fabricators of steel in enlarged markets and new uses, only time will tell."

◆

## A. P. Cobb Dies; Pioneer in U. S. Zinc Industry

Abraham Polhemus Cobb, senior vice-president of the New Jersey Zinc Company and one of the founders and former president of the American Zinc Institute, died at his home at Hillside Place, Tarrytown, N. Y., October 6, after a long illness. He was sixty-eight years old.

Mr. Cobb, who was one of the pioneers in the zinc industry in the United States, was born in Hopewell, N. Y., on April 9, 1864, the son of the late Rev. Oliver Ellsworth Cobb and Mrs. Cornelia Whitney Polhemus Cobb.

In June, 1882, Mr. Cobb entered the New Jersey Zinc Company, which has offices at 160 Broadway, New York City, as a junior clerk. He remained with that firm throughout his lifetime, having celebrated his fifty years of service last June.

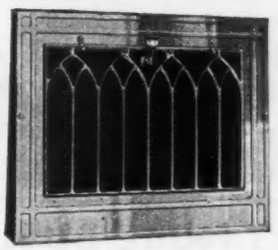
Surviving are his wife and two daughters and one son.


H&C

America's First Choice Register Line

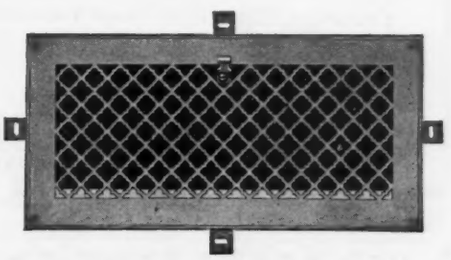
Simply because it is our constant endeavor to give the trade the best product of its kind that the market affords—the utmost in quality, sound construction, outstanding design, plus, of course, a wide range of selectivity.

A constantly increasing number of installers find it pays to standardize on H. & C.



No. 110 Baseboard Register—one of three complete baseboard lines including one- and three-piece types.

For Gravity or Air-Conditioning—installations of every type—there are H & C Registers ideally suited to the purpose. And they cost no more than others.



No. 3351 Air-Conditioning sidewall register. Our entire air conditioning line, including both one- and three-piece registers and intakes is available in any of three attractive grille designs.

WROUGHT STEEL H&C WARM AIR REGISTERS

HART & COOLEY MFG. CO.

General Sales Offices, 61 W. Kinzie St., Chicago

New Britain, Conn., Corbin Ave. Philadelphia, Architects Bldg.
Boston, 75 Portland Street New York, 101 Park Ave.

Registers for all purposes. Also a complete line of perforated and cast ornamental grilles, furnace regulators, dampers, damper regulators, pulleys, chain and the H & C Automatic Heat Control.

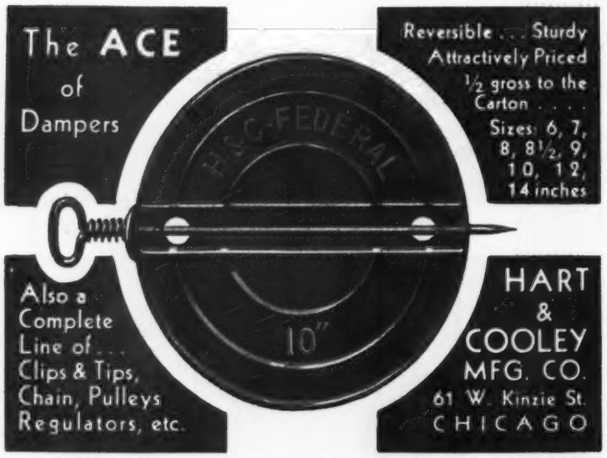
HURRAH!

*With the election over, we can now settle down to*

BUSINESS.

*Remember:*
HANDY PIPE *prices are down . . . . but not our quality*

F. MEYER & BRO. CO.
PEORIA ILLINOIS


The ACE of Dampers
Reversible . . . Sturdy
Attractively Priced
½ gross to the Carton . . . .
Sizes: 6, 7, 8, 8½, 9, 10, 12, 14 inches
P.&G. FEDERAL
10"
Also a Complete Line of . . . Clips & Tips, Chain, Pulleys Regulators, etc.
HART & COOLEY MFG. CO.
61 W. Kinzie St.
CHICAGO

"YOU GET MORE BUSINESS"

Kester Solder is easier and quicker—the acid flux is in the solder. Kester Solder is pure—it is made of virgin metals, which insures a permanent perfect job that will never break.

Your helpers like it because it saves time and brings a better result. It gives you a chance at more jobs and keeps your shop busy the whole year with permanently satisfied customers.

KESTER SOLDER COMPANY
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*Eastern Plant*, Newark, New Jersey
*Canada*, Kester Solder Company of Canada, Ltd., Brantford

KESTER SOLDER Acid-Core

KESTER FLUX-CORE SOLDER
Acid-Core • Paste-Core • Rosin-Core

"FABRIKATED" FACES
Close Mesh for Store Floors
INDEPENDENT
INDEPENDENT REGISTER & MFG. CO.
3741 East 93rd Street . . . . . Cleveland, Ohio

# News Items . . . . . .

## Special Meeting of A. S. H. V. E.

On Monday, November 21, at 5:30 p. m., a special meeting of the American Society of Heating and Ventilating Engineers is to be held in the Building Trades Club, 2 Park Ave., New York, for the purpose of taking action to amend the provisions of Article III of the By-Laws, relating to Initiation Fees and Dues as provided under the authority granted by Article XIV, Section 1 of the By-Laws.

The attendance at this special meeting is limited to those who hold membership in the Society and at the conclusion of the session all members in attendance will be invited to participate in the dinner-meeting of the Society's New York Chapter, which is to have as featured speakers, William H. Driscoll, Chairman of the Committee on Ventilation Standards; A. J. Nesbitt, Philadelphia, and Prof. C. E. A. Winslow of New Haven, Conn.

A Symposium on Ventilation will feature the dinner meeting.

◆

## Business Improvements

According to E. J. Simon, president of the General Machinery company, this firm, which has called 16 men back to work in the past month, is now employing more than at any time this year.

"Our sales in July, August and thus far this month are larger than for all the preceding months this year, and our stoker business has increased encouragingly."

One of the recent contracts secured is that for stoking and heating equipment in the Dessert Hotel in Spokane. The contract is for $8,000.

◆

## Agricola Resumes Full Schedule

The Agricola Furnace Co., Gadsden, Ala., manufacturer of heating furnaces, parts, etc., has adopted full time schedule, with normal working quota.

◆

## New Manufacturing Company

Sheet Metal Workers, Inc., Cambridge, Mass., has been organized by George H. Priggen and Joseph N. Leonard, 7 Carleton Street, capital $150,000, to manufacture sheet metal products.

◆

## Sheer Appoints New England Manager

The H. M. Sheer Co., Quincy, Illinois, announces the appointment of A. L. Pierce, Inc., 206 Vernon St., Norwood Mass., as representatives of the company throughout the New England territory.

◆

## Death of Joseph R. Bates

Joseph R. Bates, for twenty-five years Pittsburgh manager of sales for the American Sheet and Tin Plate Co., Pittsburgh, died September 26. He was 56 years old. Mr. Bates was first identified with the steel industry in his connection with the Apollo Iron and Steel Co. In 1900 when Appollo was bought by American Sheet Steel Co., Mr. Bates served in the New York office. He was placed in charge of the Pittsburgh district in 1907.

# News Items . . . . . .

## Distributors for Heat-O-Chief

Heating Systems Mfg. Co., Joliet, Illinois, announce the appointment of the following firms as distributors for the company's line of furnaces—Carr Heating Supply Co., 414 North Dearborn St., Chicago; Furnace Dealers, Inc., 2015 North 57th St., Milwaukee, Wis.

The company also reports resumption of full time operations throughout their plant.

◆

## J. E. McFate to Republic Steel

J. E. McFate, formerly associated with Jones & Laughlin Steel Corporation, has been appointed a sales representative of Republic Steel Corporation, Youngstown, Ohio, in the New England territory. Mr. McFate's headquarters will be in Boston.

◆

## New Youngstown Sales Manager

Announcement is made of the appointment of Charles H. Longfield as general sales manager of the Youngstown Sheet and Tube Co., Youngstown, Ohio. Mr. Longfield assumed his duties October 10. He formerly was with Lamson and Sessions Co., Cleveland, as vice president and sales manager.

◆

## Open New England Office

The Forest City Foundry Co., Cleveland, Ohio, announce the opening of an office at 250 Stuart St., Boston, Mass., for the transaction of New England business. Full display of the company's gas furnaces will be maintained.

The office will be handled by Herbert H. Skinner, a gas heating sales engineer from the utility field.

◆ ◆ ◆

## Voorhees—Temperature Difference

(*Continued from page* 34)

**Example of pitched roof:** What will be the temperature of air in contact with the under side of a church auditorium roof; 70 degree breathing line temperature; minimum height of ceiling 18 feet, maximum height 26 feet (Figure 17); fan system giving eight air changes per hour?

Solving by formula: Since we assume 8 air changes per hour, we substitute for 0.02 in the formula, the value 0.013 and we have:

$$T = t \times [1 + 0.013 \times (h - 5)]$$

The mean height (h) of the ceiling will be one-half the sum of the maximum and minimum values or $(26 + 18) \div 2 = 22$ feet. We substitute this value for h and 70 degrees for t, giving:

$$T = 70 \times [1 + 0.013 \times (22 - 5)]$$
$$= 70 \times [1 + 0.013 \times 17]$$
$$= 70 \times [1 + 0.22]$$
$$= 70 \times 1.22$$
$$= 85.4 \text{ degrees, mean ceiling temperature.}$$


# *Big Business on a Small Investment*

When you handle Moncrief Furnaces, you don't have to stock a whole warehouseful of furnaces to give your customers what they want promptly. Through our extensive distribution connections, you can get the type and size of furnace you want, and all the fittings, on short notice. It pays in every way to handle the Moncrief line

*Send for particulars of the Moncrief proposition.*

**The Henry Furnace & Foundry Co.**
**3471 East 49th St. Cleveland, Ohio**

*Branches at*
**Pittsburgh, Pa., and Ashtabula, Ohio**
*Eastern Office*
**224 No. 23rd St., Philadelphia, Pa., E. L. Garner, Mgr.**
*Pacific Coast Representative*
**McPherson Furnace & Equipment Co., Seattle, Wash.**

*Distributors:*

Chicago Furnace Supply Co., Chicago, Ill.
Moncrief Furnace Co., Indianapolis, Ind.
The F. H. Lawson Co., Cincinnati, Ohio.
Johnson Furnace Co., Kansas City, Mo.
E. A. Higgins Co., Omaha, Neb.
J. M. & L. A. Osborn Co., Buffalo, N. Y. and Detroit, Mich.
Geo. H. Cole Supply Co., Troy, N. Y.
W. H. Landers Co., Syracuse, N. Y.
Springfield Plumbing Supply Co., Springfield, Mass.
Sheet Metal Supply Co., Milwaukee, Wis.
Northern Metal & Mfg. Co., Green Bay, Wis.
Schrader-Easley Co., Memphis, Tenn.
Marshall-Wells Co., Duluth, Minn.
The Behler-Young Co., Grand Rapids, Mich.
Moncrief Heating Co., South Bend, Ind.
Moncrief Heating Co., Youngstown, Ohio.

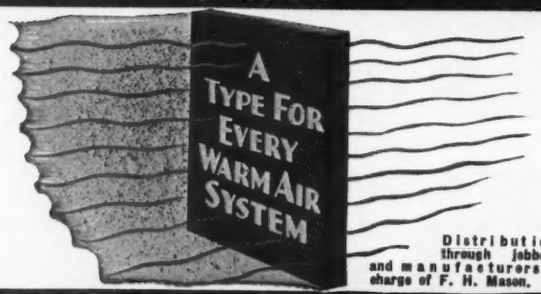
**MONCRIEF FURNACES**

WISCONSIN
*Automatic*
HUMIDIFIER

Constructed of
Cast Aluminum and Bronze.
Not affected by hard water or lime. Will not overflow or become dry. One adjustment, no service calls necessary.
***DISTRIBUTORS and DEALERS WANTED.***

**WISCONSIN HUMIDIFIER SALES CO.**
**3373 NORTH HOLTON ST. MILWAUKEE, WIS.**

AMERICAN AIR FILTERS




Distribution through jobbers and manufacturers in charge of F. H. Mason.

AMERICAN AIR FILTER COMPANY, Inc.
113 CENTRAL AVENUE LOUISVILLE, KENTUCKY

**YOU CAN DOUBLE YOUR BUSINESS THIS WINTER WITH The TORNADO Furnace Cleaner**

The TORNADO gets you into the basement where it is easy to sell repairs and new furnaces. And you make a profit on the cleaning job too!

The TORNADO is the most powerful furnace cleaner built. Complete with 10 necessary attachments. Low price — easy payments — free trial. Approved by Anthracite Institute. Thousands in use. Write now for complete information.

**Breuer Electric Mfg. Co.**
**865 Blackhawk Street, Chicago, Ill.**

*Peerless*

BLOWERS -
FURNACE FANS
MOTORS & CONTROLS

*"Only the Best"*

For the furnace manufacturer and sheet metal contractor Peerless provides complete units or parts for warm air fan and blower systems. Special equipment designed and built to specifications. Write for catalog.

**THE PEERLESS ELECTRIC COMPANY, Established 1893**
**2500 MARKET STREET**
**WARREN, OHIO**

*Complete Engineering Service for the Asking*

# New Literature . . . .

## Conditioned Air Booklet

The Meyer Furnace Co., Peoria, Ill., have assembled in booklet form the various leaflets previously published about their heating and air conditioning equipment. The loose leaf booklet is suitable for prospects as it tells the complete story of conditioning.

As now assembled, there are separate sections on the meaning of air conditioning, sections on the coal and gas furnace, the combination blower and washer unit, the blower and filter unit together with tables, charts and other useful material.

A copy of this new sales help will be mailed if you write the company.

◆

## Allegheny Metal Trade Leaflet

Allegheny Steel Co., Brackenridge, Penna., has issued the first of a series of six information bulletins describing and showing the uses to which this material is being put. The leaflet covers tubing, special sheets and castings. Copies can be obtained by writing the company.

◆

## New Steel Sheet and Strip Extras Booklet

The Inland Steel Company, Chicago, has just published a booklet entitled, "Inland Sheet and Strip Steel Products." It includes Standard Extras and Differentials, Weights, Bundling Tables, Standard Tolerances, and Trade Practices for all Inland Steel Sheet Products—including several new Inland Products made on the new continuous strip mill. Sixty-four pages packed with information valuable to buyers of steel sheets and strip.

◆

## Iron Pipe Price Card

Republic Steel Corporation, Youngstown, Ohio, has issued a new price card, effective October 1, 1932, on Toncan Copper Molybdenum Iron Pipe.

The new card, No. 4, embodies a simplified method of computing prices and reflects slight changes in prices of various sizes of Toncan Iron Pipe.

◆

## Booklet on Iron-Copper Sheets

A handsome booklet bound in a stiff, colored cover has been prepared by the Newport Rolling Mill Co., Newport, Kentucky. The pages of the booklet explain just what the iron-copper alloy sheet is and describes the material's characteristics. Following this there are general specifications for the many uses to which this material may be put. For instance, there are specifications for gutters, downspouts, roofing, siding, flashings, wainscoting, baseboards, exterior trim, cornices, marquees, valleys, scuppers, ridges, ceilings, skylights, heating and ventilating installations.

Necessarily these specifications are general and do not attempt to cover all types of uses in full detail. Each specification has accompanying photographs and drawings showing recommended construction.

The booklet is written for architects and property owners and for use as a mailing or personal call piece of literature given out by the contractor.

A copy of the booklet can be secured from the company.

# *Here are a few reasons why you should be handling*

## THE ROAN

### AUTOMATICALLY CONTROLLED FURNACE FAN

THE ROAN is the most successful furnace fan on the market today.

The Roan will increase the efficiency of any warm air plant in which it is installed.

The Roan reduces the temperature difference between the floors and ceiling.

The Roan banishes the Uncomfortable chill from the floors, corners, and far rooms of the home.

The Roan lowers the basement temperature.

The Roan forces the warm air within the shell of the furnace up into the rooms.

The Roan will increase the air circulation throughout the entire system.

The Roan is constantly working except when the fire is out.

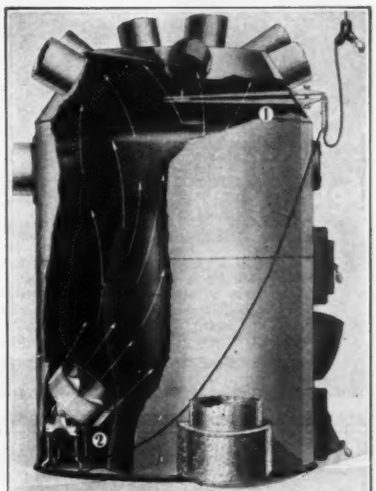
The Roan increases the humidity by pushing up the heavy humid air which is there when the water pan is kept filled.

The Roan eliminates forced firing and burnt out fire pots.

The Roan, to be installed, does not necessitate interruption of the heating service.

The Roan does not require reconstruction of the heating plant.

The speed of the fan is in direct proportion to the heat in the bonnet of the furnace—"The only fan made having this feature."



1 Showing installed position of Roan Automatic Fan Controller.
2 Showing installed position of Roan Fan Unit.

The power consumption is exceedingly low.

The Roan is absolutely guaranteed.

The Roan is priced so that the dealer enjoys a substantial profit.

*Ask your jobber or write direct to*

ROAN MFG. CO., 1222 Washington Ave., Racine, Wisconsin

# PERFORATED METALS

*for Every Requirement in*

## STEEL, BRASS, BRONZE, COPPER, ZINC, TIN-PLATE, MONEL, LEAD, STAINLESS IRON, ETC.

*Perforated to Your Order*

Round Holes from .020″ to 7″ — Oblong and Slot Holes from .008″ to 3″ wide
Ornamental Patterns—Square Holes of Standard Sizes for

Grain Separating and Grading, Ore Sizing and Screening, Coal Screening and Washing, Pulp and Paper Mills, Sugar Refining, Grilles and Ventilators, Machine and Belt Guards, Irrigation Wells, Drying Floors, Or any other purpose

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## THE HARRINGTON & KING PERFORATING CO.

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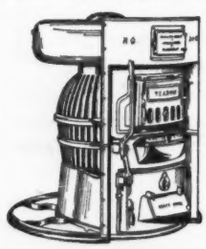
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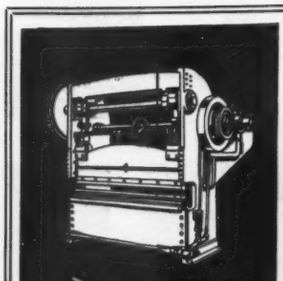
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DREIS & KRUMP MFG CO.

7404 LOOMIS BLVD. CHICAGO

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THE COLUMBUS HUMIDIFIER CO.

154 N. FIFTH ST. COLUMBUS, OHIO


# BUYERS' GUIDE

### AIR CLEANERS

American Air Filter Co., Inc., Louisville, Ky.
Kleenaire Filter Co., Stevens Point, Wis.
Lakeside Co., Hermansville, Mich.
Owens-Illinois Glass Co., Toledo, Ohio

### AIR CONDITIONERS
(See Unit Air Conditioners)

### AIR WASHERS

Gehri & Co., Inc., A., Tacoma, Wash.
Health Air Systems, Ann Arbor, Mich.
Hess Warming & Vent. Co., Chicago, Ill.
Lakeside Co., Hermansville, Mich.
Meyer Furnace Co., The, Peoria, Illinois.

### BLAST GATES

Berger Bros. Co., Philadelphia, Pa.

### BLOWERS

Bishop & Babcock Sales Co., The, Cleveland, Ohio.
Gehri & Co., Inc., A., Tacoma, Wash.
Health-Air Systems, Ann Arbor, Mich.
Hess Warming & Vent. Co., Chicago, Ill.
Henry Furnace & Fdy. Co., Cleveland, Ohio
Lakeside Co., Hermansville, Mich.
Meyer Furnace Co., The, Peoria, Illinois.
Peerless Electric Co., Warren, Ohio

### BRAKES—BENDING

Dreis & Krump Mfg. Co., Chicago, Ill.
Interstate Machinery Co., Chicago, Ill.

### BRAKES—CORNICE

Dreis & Krump Mfg. Co., Chicago, Ill.
Interstate Machinery Co., Chicago, Ill.

### BRASS AND COPPER

American Brass Co., Waterbury, Conn.
Revere Copper and Brass, Inc., Rome, N. Y.

### BURNERS, GAS CONVERSION

Bialosky Bros. & Co., The, Cleveland.

### CASING RINGS—FURNACE

Forest City Foundries Co., Cleveland, Ohio.
Peerless Foundry Co., Inc., Indianapolis, Ind.

### CASTINGS—MALLEABLE

Berger Bros. Co., Philadelphia, Pa.
Fanner Mfg. Company, Cleveland, Ohio

### CEILINGS—METAL

Canton Steel Ceiling Co., Canton, Ohio
Globe Iron Roofing and Corrugating Company, Cincinnati, Ohio
Milcor Steel Co., Milwaukee, Canton, Chicago, LaCrosse, Kansas City.
Osborn Co., The J. M. & L. A., Detroit, Cleveland, Buffalo

### CEMENT—FURNACE

Milcor Steel Co., Milwaukee, Canton, Chicago, LaCrosse, Kansas City.
Osborn Co., The J. M. & L. A., Detroit, Cleveland, Buffalo

### CHAIN—FURNACE

Hart & Cooley Mfg. Co., Chicago, Ill.
Russell Mfg. Co., Inc., The John M., Naugatuck, Conn.

### CHAPLETS

Fanner Mfg. Company, Cleveland, Ohio

### CLEANERS—FURNACE VACUUM

Baker Furnace Co., Toledo, Ohio.
Breuer Elec. Mfg. Co., Chicago, Ill.
National Super Service Co., Toledo, Ohio
Ramey Mfg. Co., The, Columbus, Ohio.

### CONDUCTOR ELBOWS AND SHOES

Barnes Metal Products Co., Chicago, Ill.
Berger Bros. Co., Philadelphia, Pa.
Brown Wales Co., Boston, Mass.
Globe Iron Roofing & Corrugating Co., Cincinnati, Ohio
Milcor Steel Co., Milwaukee, Canton, Chicago, LaCrosse, Kansas City
Osborn Co., The J. M. & L. A., Detroit, Cleveland, Buffalo

### CONDUCTOR FITTINGS

Barnes Metal Products Co., Chicago, Ill.
Berger Bros. Co., Philadelphia, Pa.
Brown Wales Co., Boston, Mass.
Globe Iron Roofing & Corrugating Co., Cincinnati, Ohio
Milcor Steel Co., Milwaukee, Canton, Chicago, LaCrosse, Kansas City.
Osborn Co., The J. M. & L. A., Detroit, Cleveland, Buffalo

### CONDUCTOR PIPE

Barnes Metal Products Co., Chicago, Ill.
Berger Bros. Co., Philadelphia, Pa.
Brown Wales Co., Boston, Mass.
Globe Iron Roofing & Corrugating Co., Cincinnati, Ohio
Milcor Steel Co., Milwaukee, Canton, Chicago, LaCrosse, Kansas City.
Osborn Co., The J. M. & L. A., Detroit, Cleveland, Buffalo

### CONTROLS, FURNACE

Automatic Humidifier Sales Co., Detroit, Mich.
Peerless Electric Co., Warren, Ohio

### COPPER

American Brass Co., Waterbury, Conn.
Brown Wales Co., Boston, Mass.
Revere Copper & Brass, Inc., Rome, N. Y.

### CORNICES

Globe Iron Roofing & Corrugating Co., Cincinnati, Ohio
Meyer & Bro. Co., F., Peoria, Ill.
Milcor Steel Co., Milwaukee, Canton, Chicago, LaCrosse, Kansas City
Osborn Co., The J. M. & L. A., Detroit, Cleveland, Buffalo

### CRIMPING MACHINES

Bertsch & Company, Cambridge City, Ind.
Interstate Machinery Co., Chicago, Ill.

### CUT-OFFS—RAIN WATER

Barnes Metal Products Co., Chicago, Ill.
Meyer & Bro. Co., F., Peoria, Ill.
Milcor Steel Co., Milwaukee, Canton, Chicago, LaCrosse, Kansas City
Osborn Co., The J. M. & L. A., Detroit, Cleveland, Buffalo

### DAMPERS—QUADRANTS—ACCESSORIES

Aeolus Dickinson, Chicago, Ill.
Hart & Cooley Mfg. Co., Chicago, Ill.
Milcor Steel Co., Milwaukee, Canton, Chicago, LaCrosse, Kansas City
Parker-Kalon Corp., New York, N. Y.
Young Ventilating Co., Cleveland, Ohio

### DIFFUSERS—AIR DUCT

Aeolus Dickinson, Chicago, Ill.

### DRIVE SCREWS—HARDENED METALLIC

Interstate Machinery Co., Chicago, Ill.
Parker-Kalon Corp., New York

### EAVES TROUGH

Barnes Metal Products Co., Chicago, Ill.
Berger Bros. Co., Philadelphia, Pa.
Brown Wales Co., Boston, Mass.
Globe Iron Roofing & Corrugating Co. Cincinnati, Ohio
Milcor Steel Co., Milwaukee, Canton, Chicago, LaCrosse, Kansas City
Osborn Co., The J. M. & L. A., Detroit, Cleveland, Buffalo

### EAVES TROUGH HANGERS

Barnes Metal Products Co., Chicago, Ill
Berger Bros. Co., Philadelphia, Pa.
Milcor Steel Co., Milwaukee, Canton, Chicago, LaCrosse, Kansas City

### FANS, DRAFT

Vacu-Draft Corp., Muncie, Ind.

### FANS—FURNACE

A-C Mfg. Company, Pontiac, Illinois
Gehri & Co., Inc., A., Tacoma, Wash.
Roan Mfg. Co., Racine, Wis
Peerless Electric Co., Warren, Ohio

# BUYERS' GUIDE

### FILTERS—AIR

American Air Filter Co., Inc., Louisville, Ky.
Kleenaire Filter Co., Stevens Point, Wis.
Lakeside Co., Hermansville, Mich.
Owens-Illinois Glass Co., Toledo, Ohio

### FILTERS—FURNACE

American Air Filter Co., Inc., Louisville, Ky.
Gehri & Co., Inc., A., Tacoma, Wash.
Kleenaire Filter Co., Stevens Point, Wis.
Lakeside Co., Hermansville, Mich.
Owens-Illinois Glass Co., Toledo, Ohio

### FITTINGS, PIPE, GAS STOVE

Fanner Mfg. Co., Cleveland, Ohio.

### FLUXES—SOLDERING

Kester Solder Company, Chicago, Ill.

### FORMING ROLLS

Bertsch & Company, Cambridge City, Ind.
Interstate Machinery Co., Chicago, Ill.

### FURNACE CLEANERS

(See Cleaners—Furnace Vacuum)

### FURNACES FOR GAS OR OIL

Health-Air Systems, Ann Arbor, Mich.
Henry Furnace & Foundry Co., Cleveland, Ohio.

### FURNACES—GAS

Forest City Foundries Co., Cleveland, Ohio
Henry Furnace & Foundry Co., Cleveland, Ohio
Lennox Furnace Co., Marshalltown, Iowa
Meyer Furnace Company, Peoria, Ill.
Payne Furnace and Supply Co., Beverly Hills, Calif.

### FURNACES—GAS AUXILIARY

Forest City Foundries Co., Cleveland, Ohio

### FURNACES, GAS SOLDERING

Interstate Machinery Co., Chicago.

### FURNACES—OIL BURNING

Meyer Furnace Co., The, Peoria, Illinois.
Motor Wheel Corp., Heater Div., Lansing, Mich.
Peerless Foundry Co., Indianapolis, Ind.

### FURNACES—WARM AIR

(See Also Unit Air Conditioners)

Agricola Furnace Co., Gadsden, Ala.
Andes Range & Furnace Corp., Geneva, N. Y.
Deshler Foundry & Machine Works, Deshler, Ohio
Forest City Foundries Co., Cleveland, Ohio
Fox Furnace Co., The, Elyria, Ohio.
Health-Air Systems, Ann Arbor, Mich.
Henry Furnace & Fdy. Co., Cleveland, Ohio
Hess Warming & Vent. Co., Chicago, Ill.
Lennox Furnace Co., Marshalltown, Iowa
May-Fiebeger Co., The, Newark, Ohio.
Meyer Furnace Co., The, Peoria, Illinois
Motor Wheel Corp., Heater Div., Lansing, Mich.
Mt. Vernon Furnace & Mfg. Co., Mt. Vernon, Ill.
Payne Furnace & Supply Co., Beverly Hills, Calif.
Peerless Foundry Co., Indianapolis, Ind.

### GRILLES

Harrington & King Perforating Co., Chicago, Ill.
Harl & Cooley Mfg. Co., Chicago, Ill.
Independent Register & Mfg. Co., Cleveland, Ohio.
Meyer & Bro. Co., F., Peoria, Ill.
Rock Island Register Co., Rock Island, Ill.

### GUARDS—MACHINE AND BELT

Harrington & King Perforating Co., Chicago, Ill.

### HANDLES—BOILER

Berger Bros. Co., Philadelphia, Pa.

### HANDLES—FURNACE DOOR

Fanner Mfg. Co., Cleveland, Ohio.

### HANDLES—SOLDERING IRON

Parker-Kalon Corp., New York, N. Y.

### HEATERS—CABINET

Agricola Furnace Co., Gadsden, Ala.
Motor Wheel Corp., Heater Div., Lansing, Mich.
Mt. Vernon Furnace & Mfg. Co., Mt. Vernon, Ill.
Payne Furnace & Supply Co., Beverly Hills, Calif.

### HEATERS—GAS CABINET

Mt. Vernon Furnace & Mfg. Co., Mt. Vernon, Ill.
Payne Furnace & Supply Co., Beverly Hills, Calif.

### HEATERS—SCHOOL ROOM

May-Fiebeger Co., The, Newark, Ohio.
Meyer Furnace Company, The, Peoria, Ill.
Peerless Foundry Co., Indianapolis, Ind.

### HUMIDIFIERS

Clarm Mechanical Devices Co., Lima, Ohio
Columbus Humidifier Co., Columbus, Ohio.
Hess Warming & Vent. Co., Chicago, Ill.
Lakeside Co., Hermansville, Mich.
Meyer & Bro. Company, F., Peoria, Ill.
Sallada Mfg. Co., Minneapolis, Minn.
Skuttle Co., The J. L., Dowagiac, Mich.
Wisconsin Humidifier Sales Co., Milwaukee, Wisconsin.

### MACHINERY—CULVERT

Bertsch & Co., Cambridge City, Ind.
Interstate Machinery Co., Chicago, Ill.

### MACHINERY—REBUILT AND USED

Interstate Machinery Co., Chicago, Ill.

### MACHINES AND TOOLS—SHEET METAL WORKING

Bertsch & Company, Cambridge City, Ind.
Brown Wales Co., Boston, Mass.
Dreis & Krump Mfg. Co., Chicago, Ill.
Interstate Machinery Co., Chicago, Ill.
Marshalltown Mfg. Co., Marshalltown, Iowa.
Parker-Kalon Corp., New York, N. Y.
Viking Shear Co., Erie, Pa.
Whitney Mfg. Co., W. A., Rockford, Ill.

### METAL LATH—EXPANDED

Barnes Metal Products Co., Chicago, Ill.
Milcor Steel Co., Milwaukee, Canton, Chicago, LaCrosse, Kansas City.
Osborn Co., The J. M. & L. A., Detroit, Cleveland, Buffalo.

### MITERS

Barnes Metal Products Co., Chicago, Ill.
Berger Bros. Co., Philadelphia, Pa.
Milcor Steel Co., Milwaukee, Canton, Chicago, LaCrosse, Kansas City.
Osborn Co., The J. M. & L. A., Detroit, Cleveland, Buffalo.

### NAILS—HARDENED MASONRY

Interstate Machinery Co., Chicago, Ill.
Parker-Kalon Corp., New York, N. Y.

### PERFORATED METALS

Harrington & King Perforating Co., Chicago, Ill.

### PIPE AND FITTINGS—FURNACE

Dieckmann Co., The Ferdinand, Cincinnati, Ohio
Henry Furnace & Fdy. Co., Cleveland, Ohio.
Meyer & Bro. Co., F., Peoria, Ill.
Milcor Steel Co., Milwaukee, Canton, Chicago, LaCrosse, Kansas City.
Osborn Co., The J. M. & L. A., Detroit, Cleveland, Buffalo
Peerless Foundry Co., Indianapolis, Ind.

### POKERS—FURNACE

Fanner Mfg. Co., Cleveland, Ohio.
Henry Furnace & Foundry Co., Cleveland, Ohio.
Independent Reg. & Mfg. Co., Cleveland, Ohio.


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Safety Chain

Sash Chain

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*A Cold Valve Operating Inside a Water Sealed Air Chamber, Does the Trick*

CLARM MECHANICAL DEVICES CO.
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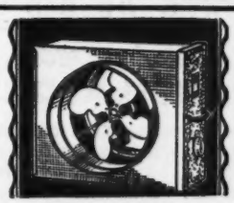

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A-C MANUFACTURING CO.
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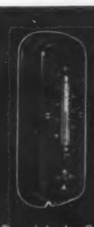

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Handled by leading jobbers.

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When you finish reading American Artisan this month pass it on to others in your organization. Mark the articles in which they should be interested.

Then file it for future reference. You never know when you will encounter a problem in your business that is covered in this very issue.

# BUYERS' GUIDE

### PRESSES
Dries & Krump Mfg. Co., Chicago, Ill.

### PULLEYS—FURNACE
Hart & Cooley Mfg. Co., Chicago, Ill.

### PUNCHES
Bertsch & Co., Cambridge City, Ind.
Interstate Machinery Co., Chicago, Ill.
Parker-Kalon Corp., New York, N. Y.
W. A. Whitney Mfg. Co., Rockford, Ill.

### PUNCHES—COMBINATION BENCH AND HAND
Interstate Machinery Co., Chicago, Ill.
Parker-Kalon Corp., New York, N. Y.

### PUNCHES—HAND
Interstate Machinery Co., Chicago, Ill.
Parker-Kalon Corp., New York, N. Y.
W. A. Whitney Mfg. Co., Rockford, Ill.

### RADIATOR CABINETS
Hart & Cooley Mfg. Co., Chicago, Ill.
Meyer & Bro. Co., F., Peoria, Ill.
Revere Copper & Brass, Inc., New York City.

### REGISTERS
Forest City Foundries Co., Cleveland, Ohio.
Hart & Cooley Mfg. Co., Chicago, Ill.
Henry Furnace & Fdy. Co., Cleveland, Ohio.
Independent Register & Mfg. Co., Cleveland, Ohio.
Meyer & Bro. Co., F., Peoria, Ill.
Milcor Steel Co., Milwaukee, Canton, Chicago, LaCrosse, Kansas City.
Osborn Co., The J. M. & L. A., Detroit, Cleveland, Buffalo
Peerless Foundry Co., Indianapolis, Ind.

### REGISTERS—WOOD
Auer Register Co., Cleveland, Ohio.
Milcor Steel Co., Milwaukee, Canton, Chicago, LaCrosse, Kansas City.
Osborn Co., The J. M. & L. A., Detroit, Cleveland, Buffalo

### REGULATORS AND LOCKS, VOLUME DAMPER
Young Ventilating Co., The, Cleveland, O.

### REGULATORS—AUTOMATIC HEAT
Cook Electric Co., Chicago, Ill.
Hart & Cooley Mfg. Co., Chicago, Ill.
Minneapolis-Honeywell Regulator Co., Minneapolis, Minn.
White Mfg. Co., St. Paul, Minn.

### REGULATORS, DRAFT, AUTOMATIC
Vacu Draft Corp., Muncie, Ind.

### REPAIRS—STOVE AND FURNACE
Brauer Supply Co., A. G., St. Louis, Mo.
National Foundry & Furnace Co., Dayton, Ohio.
Peerless Foundry Co., Indianapolis, Ind.

### RIDGING
Barnes Metal Products Co., Chicago, Ill.
Berger Bros. Co., Philadelphia, Pa.
Globe Iron Roofing & Corrugating Co., Cincinnati, Ohio.
Milcor Steel Co., Milwaukee, Canton, Chicago, LaCrosse, Kansas City.
Osborn Co., The J. M. & L. A., Detroit, Cleveland, Buffalo

### RINGS—FURNACE CASING
Forest City Foundries Co., Cleveland, Ohio.

### ROOF FLASHING
Barnes Metal Products Co., Chicago, Ill.
Globe Iron Roofing & Corrugating Co., Cincinnati, Ohio.
Milcor Steel Co., Milwaukee, Canton, Chicago, LaCrosse, Kansas City.
Osborn Co., The J. M. & L. A., Detroit, Cleveland, Buffalo

### ROOFING—IRON AND STEEL
American Rolling Mill Co., Middletown, Ohio.
Barnes Metal Products Co., Chicago, Ill.
Brown Wales Co., Boston, Mass.
Globe Iron Roofing & Corrugating Co., Cincinnati, Ohio.
Inland Steel Company, Chicago, Ill.
Milcor Steel Co., Milwaukee, Canton, Chicago, LaCrosse, Kansas City.
Newport Rolling Mill Co., The, Newport, Ky.
Osborn Co., The J. M. & L. A., Detroit, Cleveland, Buffalo
Republic Steel Corp., Youngstown, Ohio.

### ROOFING—TIN AND TERNE
Berger Bros. Co., Philadelphia, Pa.
Brown Wales Co., Boston, Mass.
Milcor Steel Co., Milwaukee, Canton, Chicago, LaCrosse, Kansas City.
Newport Rolling Mill Co., Newport, Ky.
Osborn Co., The J. M. & L. A., Detroit, Cleveland, Buffalo
Republic Steel Corp., Youngstown, Ohio.

### RUBBISH BURNERS
Hart & Cooley Mfg. Co., Chicago, Ill.

### SCREWS—HARDENED METALLIC DRIVE
Interstate Machinery Co., Chicago, Ill.
Meyer & Bro. Co., F., Peoria, Ill.
Milcor Steel Co., Milwaukee, Canton, Chicago, LaCrosse, Kansas City.
Osborn Co., The J. M. & L. A., Detroit, Cleveland, Buffalo
Parker-Kalon Corp., New York City.

### SCREWS—HARDENED SELF TAPPING SHEET METAL
Interstate Machinery Co., Chicago, Ill.
Milcor Steel Co., Milwaukee, Canton, Chicago, LaCrosse, Kansas City.
Osborn Co., The J. M. & L. A., Detroit, Cleveland, Buffalo
Parker-Kalon Corp., New York City.

### SCREENS—PERFORATED METAL
Harrington & King Perforating Co., Chicago, Ill.

### SCUPPERS
Aeolus Dickinson, Chicago, Ill.

### SHEARS—HAND AND POWER
Dries & Krump Mfg. Co., Chicago, Ill.
Interstate Machinery Co., Chicago, Ill.
Marshalltown Mfg. Co., Marshalltown, Iowa.
Viking Shear Company, Erie, Pa.
Whitney Mfg. Co., W. A., Rockford, Ill

### SHEET METAL SCREWS—HARDENED, SELF-TAPPING
Interstate Machinery Co., Chicago, Ill.
Parker-Kalon Corp., New York City.

### SHEETS—ALLOY
Inland Steel Company, Chicago, Ill.
International Nickel Co., New York, N. Y.
Milcor Steel Co., Milwaukee, Canton, Chicago, LaCrosse, Kansas City.
Newport Rolling Mill Co., Newport, Ky.
Osborn Co., The J. M. & L. A., Detroit, Cleveland, Buffalo
Republic Steel Corp., Youngstown, Ohio.

### SHEETS—BLACK, CORRUGATED, GALVANIZED
American Rolling Mill Co., Middletown, Ohio.
Brown Wales Co., Boston, Mass.
Granite City Steel Co., Granite City, Ill.
Inland Steel Company, Chicago, Ill.
Milcor Steel Co., Milwaukee, Canton, Chicago, LaCrosse, Kansas City.
Newport Rolling Mill Co., Newport, Ky.
Osborn Co., The J. M. & L. A., Detroit, Cleveland, Buffalo
Republic Steel Corp., Youngstown, Ohio.

### SHEETS—COPPER
American Brass Co., Waterbury, Conn.
Brown Wales Co., Boston, Mass.
Revere Copper & Brass, Inc., Rome, N. Y.

# BUYERS' GUIDE

**SHEETS—COPPER BEARING STEEL**

American Rolling Mill Co., Middletown, O.
Granite City Steel Co., Granite City, Ill
Inland Steel Co., Chicago, Ill.
Milcor Steel Co., Milwaukee, Canton, Chicago, LaCrosse, Kansas City.
Newport Rolling Mill Co., Newport, Ky.
Osborn Co., The J. M. & L. A., Detroit, Cleveland, Buffalo
Republic Steel Corp., Youngstown, Ohio.

**SHEETS—COPPER (LEAD COATED)**

American Brass Co., Waterbury, Conn.
Revere Copper & Brass, Inc., Rome, N. Y.

**SHEETS—IRON**

American Rolling Mill Co., Middletown, O.
Brown Wales Co., Boston, Mass.
Granite City Steel Co., Granite City, Ill.
Inland Steel Co., Chicago, Ill.
Milcor Steel Co., Milwaukee, Canton, Chicago, LaCrosse, Kansas City.
Newport Rolling Mill Co., Newport, Ky.
Osborn Co., The J. M. & L. A., Detroit, Cleveland, Buffalo
Republic Steel Corp., Youngstown, Ohio.
Superior
Superior Sheet Steel Co., Canton, Ohio.

**SHEETS—MONEL METAL**

International Nickel Co., New York.

**SHEETS—NICKEL**

International Nickel Co., New York.

**SHEETS—PURE IRON COPPER ALLOY**

Inland Steel Co., Chicago, Ill.
Newport Rolling Mill Co., Newport, Ky.

**SHEETS—REFINED OPEN HEARTH IRON**

American Rolling Mill Co., Middletown, O.
Republic Steel Corp., Youngstown, Ohio.

**SHEETS—SPECIAL FINISH**

American Rolling Mill Co., Middletown, O.
Inland Steel Company, Chicago, Ill.
Newport Rolling Mill Co., Newport, Ky.
Republic Steel Corp., Youngstown, Ohio.

**SHEETS, STAINLESS STEEL**

Brown Wales Co., Boston, Mass.
Republic Steel Corp., Youngstown, Ohio.

**SHINGLES AND TILE—METAL**

Globe Iron Roofing & Corrugating Co., Cincinnati, Ohio.
Milcor Steel Co., Milwaukee, Canton, Chicago, LaCrosse, Kansas City.
Osborn Co., The J. M. & L. A., Detroit, Cleveland, Buffalo

**SKYLIGHTS**

Globe Iron Roofing & Corrugating Co., Cincinnati, Ohio.
Meyer & Bro. Co., F., Peoria, Ill.
Milcor Steel Co., Milwaukee, Canton, Chicago, LaCrosse, Kansas City.
Osborn Co., The J. M. & L. A., Detroit, Cleveland, Buffalo

**SNOW GUARDS**

Berger Bros. Co., Philadelphia, Pa.

**SOLDER**

Brown Wales Co., Boston, Mass.
Kester Solder Co., Chicago, Ill.
Milcor Steel Co., Milwaukee, Canton, Chicago, LaCrosse, Kansas City.
Osborn Co., The J. M. & L. A., Detroit, Cleveland, Buffalo

**SOLDER—ACID CORE**

Kester Solder Co., Chicago, Ill.

**SOLDER—ROSIN CORE**

Kester Solder Co., Chicago, Ill.

**SOLDER—SELF-FLUXING**

Kester Solder Co., Chicago, Ill.

**STARS—HARD IRON CLEANING**

Fanner Mfg. Company, Cleveland, Ohio.

**STOKERS**

Auto-Home Stoker Corp., The, Chicago

**STOVE PIPE AND FITTINGS**

Meyer & Bro. Co., F., Peoria, Ill.
Milcor Steel Co., Milwaukee, Canton, Chicago, LaCrosse, Kansas City.
Osborn Co., The J. M. & L. A., Detroit, Cleveland, Buffalo

**STOVE AND FURNACE TRIMMINGS**

Fanner Mfg. Co., Cleveland, Ohio.

**STRAINERS—ROOF**

Barnes Metal Products Co., Chicago, Ill.

**STRAPS—ORNAMENTAL PIPE**

Barnes Metal Products Co., Chicago, Ill.

**TINPLATE**

Berger Bros. Co., Philadelphia, Pa.
Brown Wales Co., Boston, Mass.
Milcor Steel Co., Milwaukee, Canton, Chicago, LaCrosse, Kansas City.
Osborn Co., The J. M. & L. A., Detroit, Cleveland, Buffalo
Republic Steel Corp., Youngstown, Ohio.

**TOOLS—TINSMITH'S**

**(See Machines & Tools—Tinsmith's)**

**TRIMMINGS, FURNACE**

Fanner Mfg. Co., Cleveland, Ohio.

**TRIMMINGS, INCINERATOR**

Fanner Mfg. Co., Cleveland, Ohio.

**UNIT AIR CONDITIONERS**

Andes Range & Furnace Corp., Geneva, N. Y.
Forest City Foundries Co., Cleveland, O.
Fox Furnace Co., The, Elyria, Ohio.
Henry Furnace & Fdry. Co., Cleveland, O.
Health-Air Systems, Ann Arbor, Mich.
Hess Warming & Ventilating Co., Chicago, Ill.
Lakeside Co., Hermansville, Mich.
Lennox Furnace Co., Marshalltown, Iowa.
May-Fiebeger Company, Newark, Ohio.
Meyer Furnace Co., Peoria, Ill.
Motor Wheel Corp., Lansing, Mich.
Payne Furnace & Supply Co., Beverly Hills, Calif.

**VACUUM CLEANERS—FURNACE**

**(See Cleaners—Furnace Vacuum)**

**VENTILATORS—CEILING**

Hart & Cooley Mfg. Co., Chicago, Ill.
Henry Furnace & Fdy. Co., Cleveland, O.
Independent Reg. & Mfg. Co., Cleveland, Ohio.

**VENTILATORS—FLOOR**

Aeolus Dickinson, Chicago, Ill.

**VENTILATORS—ROOF**

Aeolus Dickinson, Chicago, Ill.
Berger Bros. Co., Philadelphia, Pa.
Jordan & Co., Paul R., Indianapolis, Ind.
Meyer & Bro. Co., F., Peoria, Ill.
Milcor Steel Co., Milwaukee, Canton, Chicago, LaCrosse, Kansas City.
Osborn Co., The J. M. & L. A., Detroit, Cleveland, Buffalo
Uno Ventilator Co., Cliftondale, Mass.

**WELDERS, SPOT**

Interstate Machinery Co., Chicago.

**WOOD FACES—WARM AIR**

Meyer & Bro. Co., F., Peoria, Ill.
Milcor Steel Co., Milwaukee, Canton, Chicago, LaCrosse, Kansas City.
Osborn Co., The J. M. & L. A., Detroit, Cleveland, Buffalo

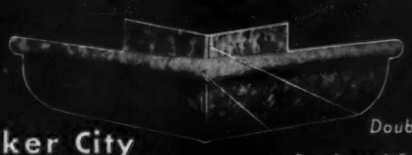

FURNACE REPAIRS

*To Fit All Makes of Furnaces*

*Quick Service by Express Freight or Truck*

SEND FOR OUR NEW CATALOG
*THE* PEERLESS FOUNDRY *COMPANY*
INDIANAPOLIS INDIANA

"BB" QUALITY



Quaker City Mitre
Double Seam
Reinforced Corner
WRITE FOR "BB" CATALOGUE
Order from your jobber
Mitres, conductor pipe, hangers, eaves trough, caps, outlets, pipe hooks and fasteners
BERGER BROTHERS CO.
229-237 ARCH STREET, PHILADELPHIA, PA.

No. 00
HEADQUARTERS for CHAIN—S-HOOKS
FURNACE ACCESSORIES
All the leading types and sizes of chain and S-Hooks — priced as low as is consistent with quality. Furnished on reels or in desired lengths in cartons. Bright, electro-galvanized or coppered finish. Also a full line of furnace regulators, pulleys, dampers and damper control sets. Write for Furnace Accessories Catalog.
HART & COOLEY Mfg. Co.
61 W. KINZIE ST. CHICAGO
No. 9
No. 18
No. 1

BERTSCH TREADLE SHEAR

SQUARES, TRIMS AND SLITS
all sheets 14 gauge or lighter
Write for Catalog "g" Today
BERTSCH & CO., Cambridge City, Ind.

MARSHALLTOWN THE MARSHALLTOWN LINE SHEARS

No. 18

# SHEARS THAT CUT

That's what you're looking for—shears that will save money for you—shears that stand the gaff.

Install at least one type of Marshalltown throatless shears in your shop. Do it now!

SHEARS FOR EVERY JOB: CUTTING CAPACITY UP TO ½".

The MARSHALLTOWN line is complete—a shear for every use.

THE CATALOGUE TELLS THE STORY—WRITE FOR IT

**SPECIFICATIONS**

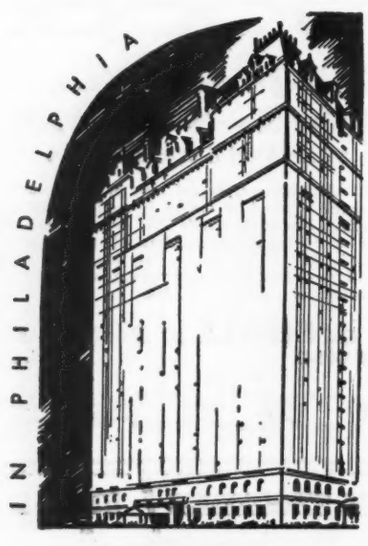
**CAPACITY—**
18 gauge and lighter—1¾" radius.

**CUTTERS—**
2"x1½"—high grade tool steel. Slightly knurled to feed material.

**ADJUSTMENT—**
One bolt. Instructions furnished.

**SIZE AND MATERIAL—**
Height 19½"; head cast steel; base cast iron; gears steel and cast iron. Shipping weight 45 lbs.

MARSHALLTOWN MFG. CO. MARSHALLTOWN IOWA

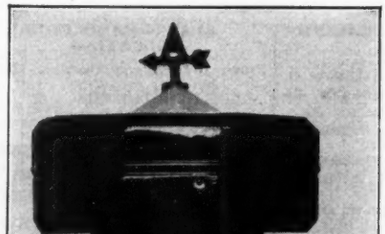



● You will recognize in the distinguished atmosphere of the Bellevue-Stratford an unmistakable assurance of irreproachable service in every department. You will enjoy its beautiful appointments—and its location in the very center of business and social life. Rates are consistent with present times.

BELLEVUE STRATFORD

● CLAUDE H. BENNETT, General Manager

*The*
**JORDAN ATTIC VENTILATOR**



Straight flaring base. Sets low and looks well. Operated by gravity and wind action.

The Jordan Attic Ventilator presents an opportunity which offers profits to you *right now*. Write for information. There is summer business to be had and you can get it.

*Also Fan Ventilators, Rotary Ventilators, Stationary Ventilators, Wall Exhaust Fans, etc.*

BACKED BY A COMPLETE ENGINEERING SERVICE.

**PAUL R. JORDAN CO.**
631 S. Delaware St., Indianapolis, Ind.

**STATEMENT OF THE OWNERSHIP, MANAGEMENT, CIRCULATION, ETC., REQUIRED BY THE ACT OF CONGRESS OF AUGUST, 24, 1912.**

Of AMERICAN ARTISAN, published monthly at Chicago, Ill., for October 1, 1932.

State of Illinois, County of Cook—ss.

Before me, a Notary Public in and for the State and county aforesaid, personally appeared D. J. Hansen, who, having been duly sworn according to law, deposes and says that he is the manager of the AMERICAN ARTISAN and that the following is, to the best of his knowlledge and belief, a true statement of the ownership, management (and if a daily paper, the circulation), etc., of the aforesaid publication for the date shown in the above caption, required by the Act of August 24, 1912, embodied in section 411, Postal Laws and Regulations, printed on the reverse of this form, to-wit:

1. That the names and addresses of the publisher, editor, managing editor, and business managers are: Publisher, Engineering Publications, Inc., Chicago, Ill.; Editor, F. P. Keeney, Chicago, Ill.; Managing Editor, J. D. Wilder, Chicago, Ill.; Business Manager, D. J. Hansen, Chicago, Ill.

2. That the owner is: (If owned by a corporation, its name and address must be stated and also immediately thereunder the names and addresses of stockholders owning or holding one per cent or more of total amount of stock. If not owned by a corporation, the names and addresses of the individual owners must be given. If owned by a firm, company, or other unincorporated concern, its name and address, as well as those of each individual member, must be given.) Engineering Publications, Inc., 1900 Prairie Ave., Chicago, Ill.; Stockholders, F. P. Keeney, Chicago; O. T. Carson, Chicago; E. D. Winslow, New York City; R. Herlov, Chicago; C. L. Davis, Chicago; E. G. Hutchison, Chicago; R. Payne Wettstein, Pittsburgh, Pa.; W. J. Osborn, Fairfield, Conn.; D. M. Kenney, Chicago; D. J. Hansen, Chicago.

That the known bondholders, mortgagees, and other security holders owning or holding 1 per cent or more of total amount of bonds, mortgages, or other securities are: (If there are none, so state.) None.

4. That the two paragraphs next above, giving the names of the owners, stockholders, and security holders, if any, contain not only the list of stockholders and security holders as they appear upon the books of the company but also, in cases where the stockholder or security holder appears upon the books of the company as trustee or in any other fiduciary relation, the name of the person or corporation for whom such trustee is acting, is given; also that the said two paragraphs contain statements embracing affiant's full knowledge and belief as to the circumstances and conditions under which stockholders and security holders who do not appear upon the books of the company as trustees, hold stock and securities in a capacity other than that of a bona fide owner; and this affiant has no reason to believe that any other person, association, or corporation has any interest direct or indirect in the said stock, bonds, or other securities than as so stated by him.

5. That the average number of copies of each issue of this publication sold or distributed, through the mails or otherwise, to paid subscribers during the six months preceding the date shown above is .....
(This information required from daily publications only.)

D. J. Hansen, Business Manager.

Sworn to and subscribed before me this 22nd day of September, 1932.
(Seal) L. M. Dixon.
(My commission expires September 14, 1934.)

# CLASSIFIED ADVERTISING

## SITUATIONS OPEN

WANTED—ESTABLISHED SALES ENGINEERS or manufacturers' agents with knowledge of forced air heating or air conditioning, who can handle definite territory on commission basis, on a well engineered line of equipment, which is showing a record of outstanding performance, and giving real satisfaction to both customer and dealer. Only high grade men with engineering knowledge need apply. Furnish your engineering record and your complete sales experience and references. Address Key 194, "American Artisan," 1900 Prairie Avenue, Chicago.

DESIGNER WANTED—AN OLD, ESTABlished, well-known stove company wants a successful designer with years of experience. State age, complete experience and any references. Address Key 181, "American Artisan," 1900 Prairie Ave., Chicago, Illinois.

WANTED—TO CORRESPOND WITH A good sheet metal and furnace man, one that also understands gas furnaces and can do gas work also. State experience in first letter. Address J. H. Barnett, Dodge City, Kan.

## SITUATIONS WANTED

WANTED POSITION—BY FIRST CLASS sheet metal worker. Good at ventilation and dust and shaving collecting systems. Also other work. Can go out and close up jobs. Address Metal Worker, 1509 West Center Street, Milwaukee, Wis.

SITUATION WANTED—BY TINNER OF experience. Hardware clerk and do plumbing. Best of references, full particulars in future correspondence. Address M. B. Miles, Route 4, Box 182, Des Moines, Ia.

EXPERIENCED FURNACE SALESMAN would like position representing responsible manufacturer in Ohio. Address Key 193, "American Artisan," 1900 Prairie Avenue, Chicago.

SITUATION WANTED—SHEET METAL worker desires connection, preferably Illinois. Experienced in all lines of sheet metal work. 34 years old. Regular habits. Address Key 176, "American Artisan," 1900 Prairie Ave., Chicago, Illinois.

SITUATION WANTED—CAN STRENGTHEN your sales force. Seventeen years with one furnace and stove manufacturer, as their Ohio district manager. Had charge of the sales, collection and advertising for that division. Have complete knowledge of the heating business, standard code, etc. Operating my own business at present; however, prefer traveling again. Can furnish highest reference as to selling ability, character. Prefer Ohio; however am willing to work your toughest territory. Address Key 187, "American Artisan," 1900 Prairie Avenue, Chicago.

SITUATION WANTED—BY TINNER, furnace man, and sheet metal worker. A-1 mechanic and pattern drafter, twenty-one years experience, good plumber, some hardware experience, thirty-nine years of age, nationality, American. Will accept medium wage and move anywhere for steady position. Ohio, Indiana, Michigan, Pennsylvania or Kentucky preferred. Address Key 191, "American Artisan," 1900 Prairie Avenue, Chicago.

EXPERIENCED SHEET METAL SALESman wants position representing responsible manufacturer in the state of Iowa. Address Key 177, "American Artisan," 1900 Prairie Ave., Chicago, Illinois.

CORRESPONDENCE SOLICITED WITH manufacturer developing or producing air conditioning units, or with furnace, sheet metal contractor who desires the services of a reliable man. 20 years' practical experience in engineering, estimating and sales. Address Key 180, "American Artisan," 1900 Prairie Ave., Chicago, Illinois.

## FOR SALE

FOR SALE—A GOING PLUMBING, heating and sheet metal business. Town fifteen hundred, near Chicago. Good farm community. Very reasonable. Sickness reason for selling. Write for particulars if you mean business. Address Key 189, "American Artisan," 1900 Prairie Avenue, Chicago.

FOR SALE—GENERAL SHEET METAL and warm air heating shop, the only exclusive shop of its kind in a town of 12,000 population, large trade territory. This is a real opportunity for someone who can do good work and uphold a good reputation. Will sell at inventory, which will run around $2500.00. This is no depression offer. Do not answer unless you can handle this. Address Key 183, "American Artisan," 1900 Prairie Avenue, Chicago.

CHRISTIE FURNACE CLEANER. LARGE size. Used twelve times. Perfect shape, $75.00. Address Key 185, "American Artisan," 1900 Prairie Avenue, Chicago.

FOR SALE—FURNACE AND SHEET metal business in town of North East, Erie County, Pennsylvania. Population of town about 3,500; a prosperous community. Business well established. Stock and tools for sale cheap. Reason for selling—poor health. Address Eldon Denton, North East, Erie County, Pennsylvania.

FOR SALE—10 FT. 16 GA. OHL POWER squaring shear in excellent condition. Address Key 190, "American Artisan," 1900 Prairie Avenue, Chicago.

FOR SALE—FURNACE AND SHEET metal shop. Price is reasonable. Write for further particulars. Address W. A. Halbleib, Marengo, Illinois.

## LINES WANTED

FURNACE SALESMAN WOULD LIKE to represent a good furnace and stove manufacturer in Wisconsin. Address Key 192, "American Artisan," 1900 Prairie Avenue, Chicago.

## WANTED TO BUY

WANTED—BY A PRACTICAL TINNER and plumber an opportunity to buy one-half interest in a good plumbing and tinning business. Address Key 184, "American Artisan," 1900 Prairie Avenue, Chicago.

WANTED—USED CROSS LOCK SEAMER. Address Julius Hauser & Son, 817 North Fulton Ave., Evansville, Indiana.

## MISCELLANEOUS


**PROGRESS MEANS CHANGE!**

**From mud cements to META LUTE Plastic Iron Cement, a powdered metal compound that is mixed on the job. Permits immediate firing. It's different.**

**COLOR-BESTOS—Asbestos in Paint Form — Fire-proof, oil-proof, acid-proof. Double seals leaky furnaces without resetting and better than asbestos paper for metal surfaces.**

**Special Offer—Gallon of each and free catalog on cementing research, all for $5.00.**

**TECHNICAL PRODUCTS COMPANY**

**Pittsburgh [Sharpsburg Station] Pennsylvania**

*Makers of INSA-LUTE*

**Patents and Trade Marks**

Philip V. W. Peck

**Barrister Bldg., Washington, D. C.**

**MAILING LISTS**

**Pave the way to more sales with actual names and addresses of Live prospects.**

**Get them from the original compilers of basic list information—up to date—accurate—guaranteed.**

**Tell us about your business. We'll help you find the prospects. No obligation for consultation service.**

60 page Reference Book and Mailing LIST CATALOG

**Gives counts and prices on 8,000 lines of business. Shows you how to get special lists by territories and line of business. Auto lists of all kinds.**
**Shows you how to use the mails to sell your products and services. Write today.**

**R. L. POLK & CO.**
**Polk Bldg.—Detroit, Mich.**
***Branches in Principal Cities***
**World's Largest City Directory Publishers**

**Mailing List Compilers. Business Statistics. Producers of Direct Mail Advertising.**

**IT'S YOUR MONEY—BUT WHY WASTE IT?**

**See Us Before-U-Buy**
**SHEET METAL MACHINERY**
*We Can Save You Time and Money*

*NEW USED HAND and POWER*

**SEND FOR BULLETIN C-2 "INTERSTATE HAS IT"**

**REBUILT BARGAINS**

| | |
|---|---|
| 30" Wright's Pipe Folder $10.00 | 30" Bar Folder $25.00 |
| 3 to 12 Ft. Ch'go Steel Brakes | No. 2 Whitney Punch $7.50 |
| 200 Amp. Arc Welder | Ch'go Elbow Machine $125 |

ROLLS - SHEARS - BRAKES
SPOT WELDERS - PUNCH PRESSES
PRESS BRAKES - FOLDERS - DRILLS

**INTERSTATE MACHINERY CO.**
**130 S. CLINTON ST., CHICAGO**

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# *New List Prices* ON UNOS

Write your jobber for the lowered 1932 prices on the improved UNO.

◆

Repricing gives all sizes —4 inches to 48 inches —at the lowest cost of all turbines.

◆

Make EXTRA PROFIT . . . and please your customer.

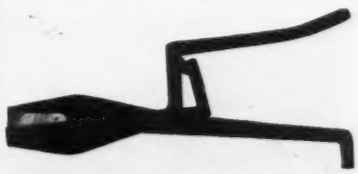
*Sure as sunrise . . . No oiling . . . No greasing . . . Wind driven . . . Powerful suction . . . Electric welded . . . Silent . . . No down drafts . . . Rain proof.*

**UNO VENTILATOR CO.**
CLIFTONDALE MASSACHUSETTS

# *You need this tool in* AIR CONDITIONING *work* » » » » »

Cool comfort in the warm months and warm comfort in the cool months—in other words, the need for air conditioning is apparent throughout the entire year. The increase in the interest shown in air conditioning is demonstrating very forcibly to the furnace and sheet metal industries the potential possibilities of this work.

And incidentally, in connection with air conditioning work, where you are called upon to use a shears, make the most of these opportunities by using the Viking Portable Shear. Work with it in the shop or on the job. In either place it is a whale for work, and a profit maker in the time it saves.



●

*Send for Particulars*

●

**VIKING SHEAR CO.**
ERIE PA.

# *The* VIKING *Shear*

# HERE! AT BROWN WALES CO.

**Armco Ingot Iron**
**Galvanized Steel**
**Even Color Sheets**
**Roofing Sheets**
**Copper and Zinc**

**Stainless Sheets**
**Paint Grip Sheets**

**Conductor Fittings**
**Tin**
**Solder**
**Tools**

YOU'LL FIND THE PRODUCTS YOU NEED
THE WAY YOU WANT THEM

**BROWN WALES CO.**
493 C STREET, BOSTON, MASS.

Members Armco Dist. Assn.

# A Complete Line *of* Parts *at factory prices*

We can ship promptly, parts for the following furnaces:

| | | | |
|---|---|---|---|
| Acorn | Garland | Leeson | Remoh |
| Ajax | Gem | Marshall | Rudy |
| American | Great Bell | Masterbuilt | Success |
| Berry | Harmon | Michigan | Sunbeam |
| Calorie | Hercules | Moncrief | Thatcher |
| Carton | Hero | Monitor | Titan |
| Comfort | Homer | Mueller | Victory |
| Empire | Ideal | Niagara | Wayne |
| Eureka | International | Ottawa | Weir |
| Faultless | Jewel | Peninsular | Welcome |
| Favorite | Kalamazoo | Perfect | Williamson |
| Floral City | Kernan | Premier | Wolverine, and |
| Follansbee | Lackawanna | Princess | All Others |
| Fox | Laurel | Progressive | |

## THE STAR STEEL SUPPLY CO.

*Parts for all makes of Furnaces and Steam Boilers*

7516-22 OAKLAND AVE., DETROIT, MICH.

*Boiler Parts.*

| | | | | |
|---|---|---|---|---|
| American | Winchester | Ideal—All Types | Pebco | Richardson |
| Arco | Continental | Imperial | Pierce | Royal |
| Arcola | Floral City | Mueller | Radiant | Vecto |
| Capitol-Solar | | | | And All Others |

# MODERN CONSTRUCTION IS SPECIFYING STEEL!

STEEL is the present day demand in home building. A permanent Steel Ceiling offers many advantages in safety and economy. This demand is resulting in business for the sheet metal worker who is aggressive—who will go a step further than the average dealer—who will go into the home with the story of the CANTON Line of Steel Ceilings for small homes.

Write for this story and for our dealer helps, literature and newspaper mats. Then go out after this business.

*Sold through leading Sheet Metal Jobbers in the United States*

## CANTON STEEL CEILING CO.

CANTON OHIO

# DON'T *take our word for it!* Read what others say about the X-L-ALL RUGGED STEEL WARM AIR FURNACE

[PAT. APPLIED FOR]

DESHLER FOUNDRY & MACHINE WORKS,
140 S. East Ave., Deshler, O.

Your furnace has been in our home for three years. During this time there has been no sign of trouble or any failure to operate properly.

The furnace we formerly had installed in our home failed to drive the heat into the rooms.

We believe your furnace to be the best standard make of furnace on the market at the present time.

We gladly recommend the X-L-ALL Steel Warm Air Furnace to anyone and everyone.

Mrs. Rosie Teeple
Napoleon, Ohio

*Write today for your Free Copy of the Interesting* X-L-ALL *Furnace Book and Dealer Proposition*

# WHITNEY LEVER PUNCHES

**No. 1 PUNCH**

Length, 34 inches. Capacity ⅝-inch hole through ⅛-inch iron. Punches and dies in sizes from ⅛ to ⅝ by 64ths.

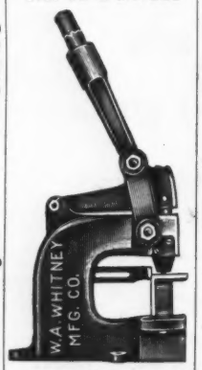
**No. 2 PUNCH**

Length, 23 inches. Capacity ⅜-inch hole through ⅛-inch iron. Punches and dies in sizes, ⅜-inch to ½-inch by 64ths.

**CHANNEL IRON PUNCH**

Companion to No. 2 Punch. Every part of the two Punches Interchangeable, including punches and dies. Capacity, ⅛-inch hole through ⅛-inch iron.

**No. 91 PUNCH**




Capacity — ⅝-inch hole through ⅛-inch. 1-inch hole through ⅜-inch and 2-inch hole through ⅛-inch iron. Depth throat 5-inches. Weight 82 lbs.

*We have tools for every purpose needed by Sheet Metal Contractors.*

*Ask your Jobber*

**No. 4B PUNCH**

Length—8½ inches. Capacity—⅛-inch through 16 gauge. Deep Throat—2 inches. Weight—3 pounds. Punches and Dies—⅛" to ⅜" by 64ths.

**No. 6 PUNCH**

Length—26½ inches. Capacity ⅛-inch hole through ⅛-inch iron; especially adapted for button punching or templet work.

## W. A. WHITNEY MFG. COMPANY

636 RACE STREET, ROCKFORD, ILL.

# MONEL METAL JOBS

## BUILD

## PROFITABLE BUSINESS

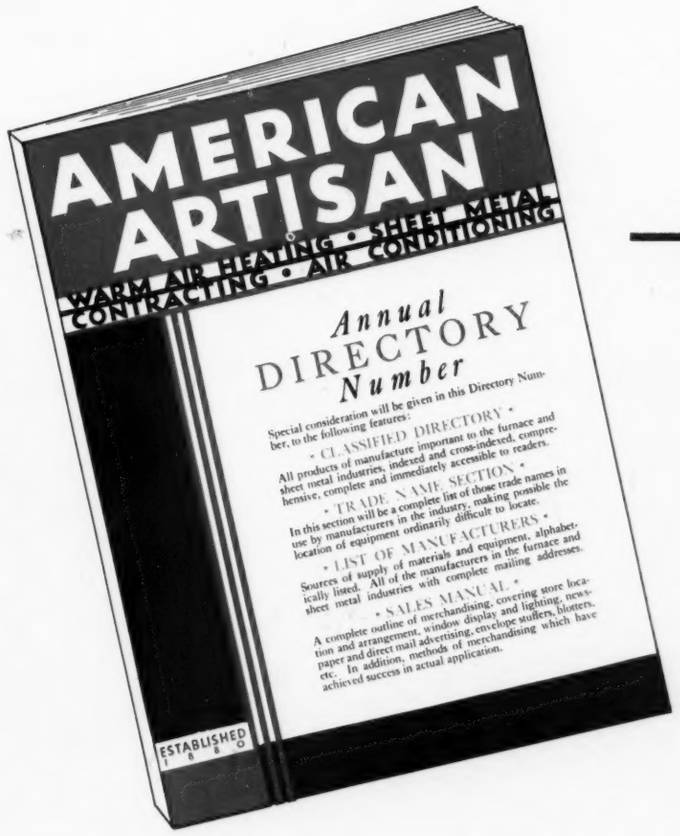
● **Demand for Monel Metal equipment is constantly growing. In every community there are homes, schools, restaurants or factories offering a good market for many different kinds of Monel Metal jobs.**

**Hundreds of sheet metal firms are making money on Monel Metal equipment...and there's no reason why you should not do the same. Read the experiences of the successful firms featured in our "True Talks" series which appears regularly in this magazine...also write us for helpful sales literature.**

**THE INTERNATIONAL NICKEL COMPANY, INC.**
**67 WALL STREET, NEW YORK, N. Y.**

A HIGH NICKEL ALLOY
MONEL METAL
NICKEL ALLOYS PERFORM BETTER LONGER

Monel Metal is a registered trade mark applied to an alloy containing approximately two-thirds Nickel and one-third copper. Monel Metal is mined, smelted, refined, rolled and marketed solely by International Nickel.


AMERICAN ARTISAN
WARM AIR HEATING • SHEET METAL
CONTRACTING • AIR CONDITIONING
Annual
DIRECTORY
Number
Special consideration will be given in this Directory Number, to the following features:
• CLASSIFIED DIRECTORY •
All products of manufacture important to the furnace and sheet metal industries, indexed and cross-indexed, comprehensive, complete and immediately accessible to readers.
• TRADE NAME SECTION •
In this section will be a complete list of those trade names in use by manufacturers in the industry, making possible the location of equipment ordinarily difficult to locate.
• LIST OF MANUFACTURERS •
Sources of supply of materials and equipment, alphabetically listed. All of the manufacturers in the furnace and sheet metal industries with complete mailing addresses.
• SALES MANUAL •
A complete outline of merchandising, covering store location and arrangement, window display and lighting, newspaper and direct mail advertising, envelope stuffers, blotters, etc. In addition, methods of merchandising which have achieved success in actual application.
ESTABLISHED 1880

# —Watch for it in December

## —Save it for Reference

# A Christmas Present to Our Subscribers!

AMERICAN ARTISAN'S subscribers will receive a Christmas present next month—an issue of the ARTISAN to keep handy for frequent use all through 1933.

It is the Annual Directory Number, designed to furnish you quickly with important information you often want in a hurry.

There's a classified directory of the products used by the sheet metal, ventilating and warm air heating trade. A second directory consists of the trade names used by the various manufacturers of these products. In each case, the name of the manufacturer is given and, by turning to the manufacturers' directory section, you'll find their complete addresses.

These three directory sections put you in position to write for information on any product without waste of time in wondering what its name is, or who makes it and where.

That's not all! The Annual Directory Number is also a Sales Manual. Outstanding merchandising and advertising plans—store and show window display layouts—the tested principles of store location and interior arrangement—these indicate what is in store for you in the Sales Manual section of the Annual Directory Number, coming in December.

A great many manufacturers have taken extra space in this issue to tell you about their products, making it more than ever a buying guide you will want to keep throughout the year.

**WATCH FOR THIS SPECIAL NUMBER—HOLD IT AT YOUR ELBOW FOR DAILY USE!**

1900 Prairie Avenue **American Artisan** Chicago, Ill.

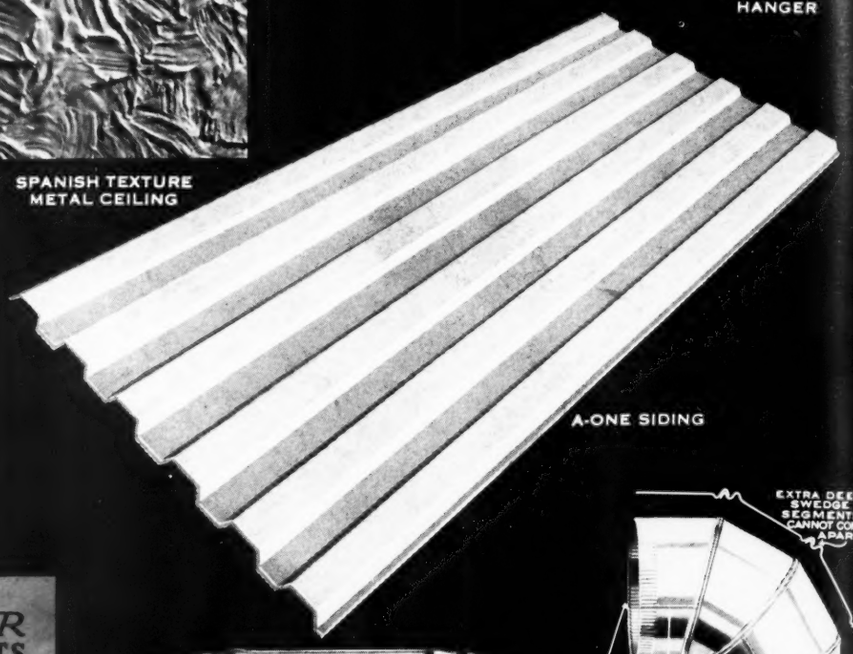
# MILCOR PRODUCTS

Save with Steel — TONCAN — ARMCO — ANACONDA Copper Alloy Steel

SPANISH TEXTURE METAL CEILING

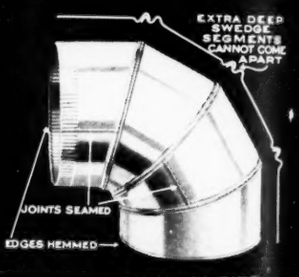
MAIL BOX NO. 2

TITELOCK HANGER

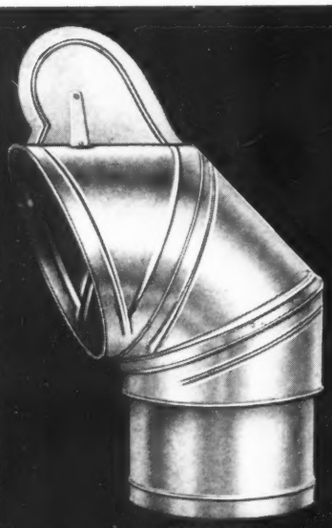


A-ONE SIDING

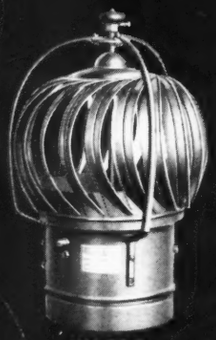
FEEDING TROUGH




FURNACE PIPE ELBOW



NU-ALPINA VENTILATOR



MILCOR TURBINE VENTILATOR

QUALITY "MILCOR" TRADE MARK PRICE

**MILCOR PRODUCTS ARE *STANDARD* OF THE WORLD**

## New And Improved Products to Help Your Sales

The Products shown here are Sales Leaders among those introduced or improved by Milcor this year.

In 1932 as in previous years Milcor has relentlessly continued its effort to produce the finest products in the sheet metal industry. Radical improvements in furnace fittings, ventilators and other items, as well as lower prices, have clinched sales for many sheet metal men. A number of new products have been offered to enlarge the field.

How many of these products have YOU been selling? Look them over—won't you write for literature which tells the complete story?

MILCOR

SHEET METAL BUILDING PRODUCTS

MILCOR STEEL COMPANY

MILWAUKEE, WIS. — CANTON, OHIO

Chicago, Ill. — Kansas City, Mo. — La Crosse, Wis.

Sales Offices: New York, 100 E. 42nd Street; Boston, Mass., 136 Federal St.; Atlanta, Ga., 314 Bona Allen Building; Little Rock, Ark., 104 W. Markham St.; Los Angeles, Calif., 5267 Clinton St.; Minneapolis, Minn., 602 Second Ave. S.